MAY, 1949

Railway Engineering and Maintenance

THE RAIL JOINT COMPANY, INC.
CHURCH ST. NEW YORK

do this job LESS OFTEN!

save with safety

Tight rail joints are a primary essential to good track maintenance.

Reliance Xtra-hy Hy-Crome Spring Washers on track bolts require a minimum of maintenance because they are scientifically designed and fabricated to provide maximum bolt tension—to keep track bolts *tighter longer*.

Made from special cold drawn alloy steel, Reliance Xtra-hy Hy-Crome Spring Washers meet all requirements of the new A. R. E. A. specifications with a comfortable margin — do not require the use of longer bolts.

Write for complete information — or ask your nearest Eaton-Reliance office.

Edgemark of Quality

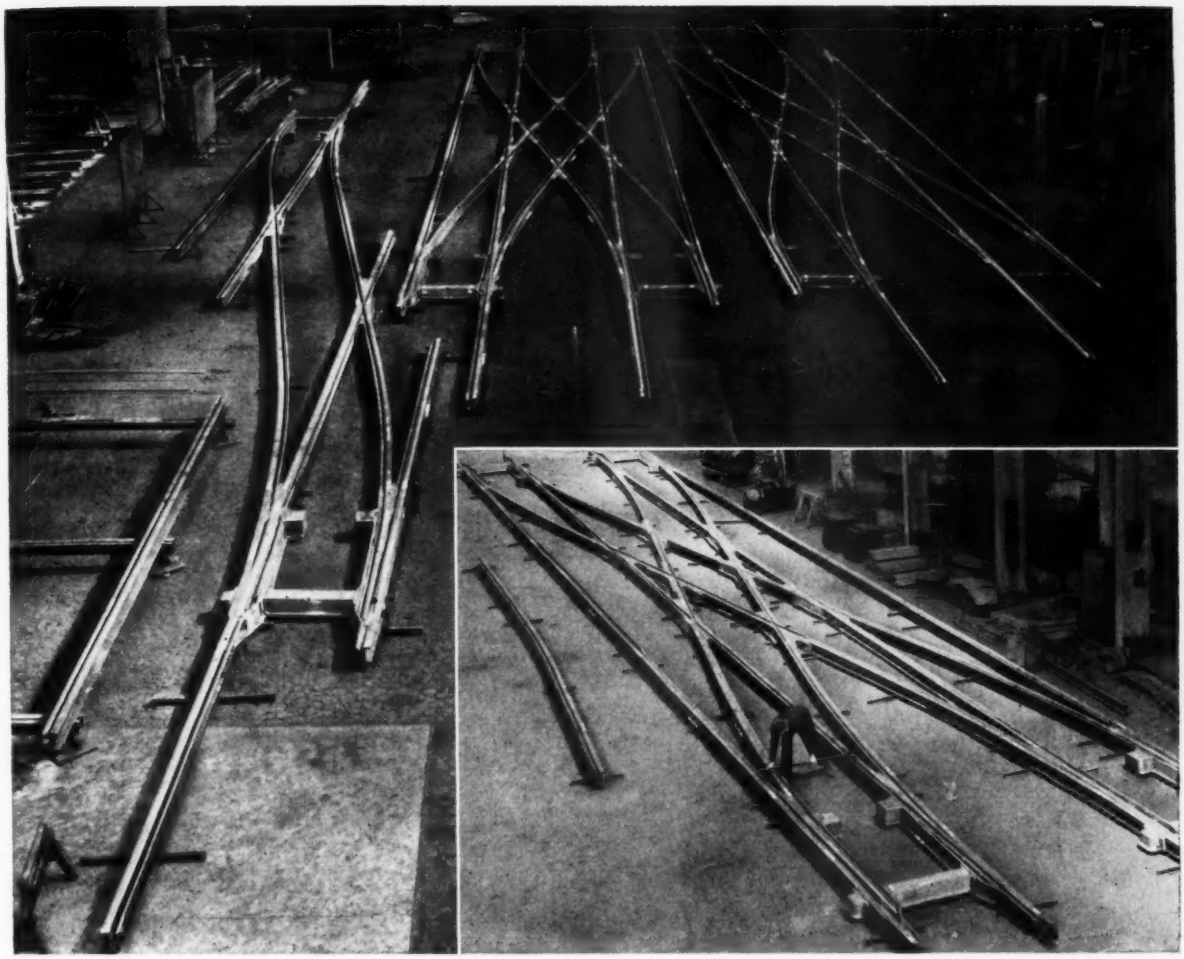
EATON

EATON MANUFACTURING COMPANY

RELIANCE Xtra-hy hy-crome SPRING WASHERS

RELIANCE DIVISION, MASSILLON, OHIO

Sales Offices: New York, Cleveland, Detroit, Chicago, St. Louis, San Francisco, Montreal



More special trackwork by BETHLEHEM

Here's another "special" in the making at Bethlehem's track shops, where unique and difficult jobs are no strangers. We've been turning them out for years, and today we are prepared better than ever for work of this nature.

The track shown here was part of a layout required when a West Coast terminal pier system was enlarged. Bethlehem was well set up to handle the special problems involved, and the job went off like clockwork.

Whenever you are considering new trackage—special or standard—let Bethlehem help you plan it. We are equipped to furnish everything you need, including the services of competent track engineers. Inquiries are always welcomed, whether your job is elaborate or on the small, simple side.

And remember, Bethlehem also manufactures a complete line of modern track accessories, including switch stands, rail braces, guard rails, frog plates, switch heaters, gage rods, etc. For full details of these products and Bethlehem's special services, ask our nearest representative to get in touch with you.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by

Bethlehem Pacific Coast Steel Corporation

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★ BETHLEHEM STEEL ★

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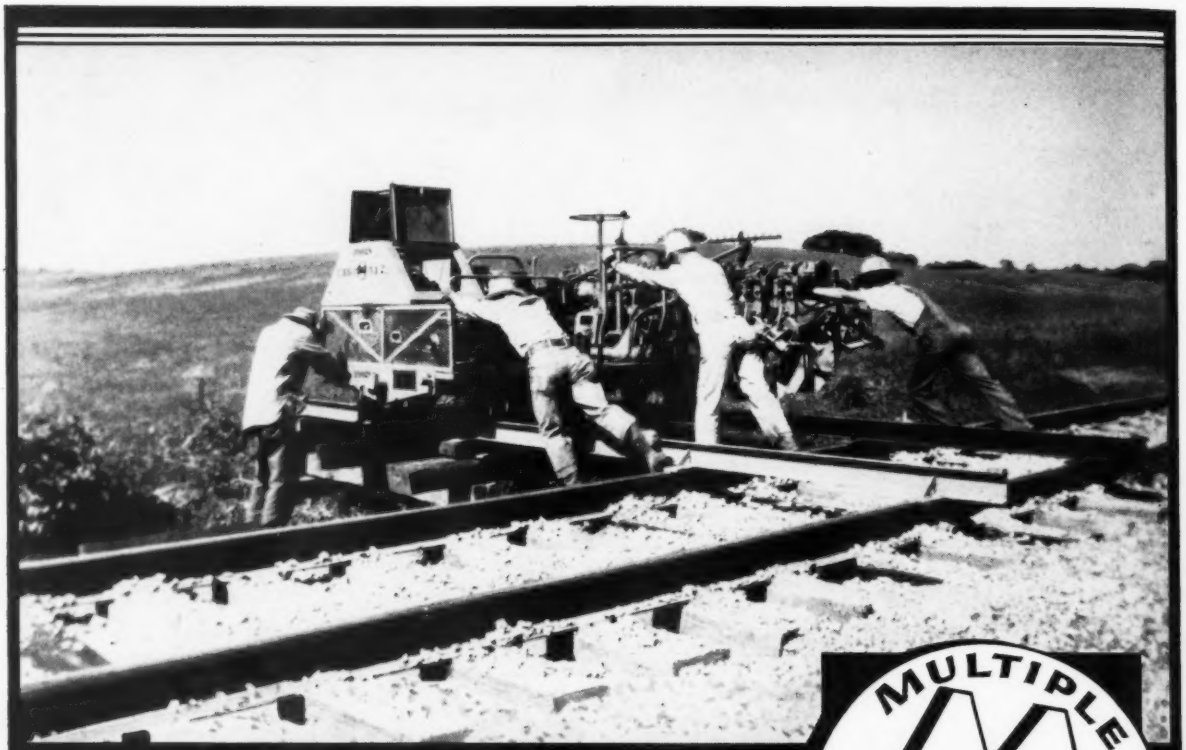


THOROUGHLY PRACTICAL ON HOT TRACK - - - -

MULTIPLE M T TAMPER

It takes just a minute or two to remove or replace the JACKSON "M-T"

This remarkable tie-tamping machine which is revolutionizing major ballasting operations is by no means limited to "dead track". Its comparatively light weight and speed of travel to predetermined set-off locations, coupled with the very little time required to remove it from, or replace it on the rails, makes its use thoroughly practical under average traffic conditions.

With its ability to put up perfect track in just ONE OPERATION—WITH JUST ONE TAMPER OPERATOR instead of 12 — IN ANY BALLAST, large or small, the results obtainable in terms of faster progress, better roadbed and labor savings are so amazing that no one responsible for maintenance of way can afford to ignore them. Let us give you the facts or the nearest location where you can see a JACKSON "M-T" at work.

ELECTRIC TAMPER & EQUIPMENT CO. Ludington, Michigan

Here was a big load of rails that catapulted right off the line.

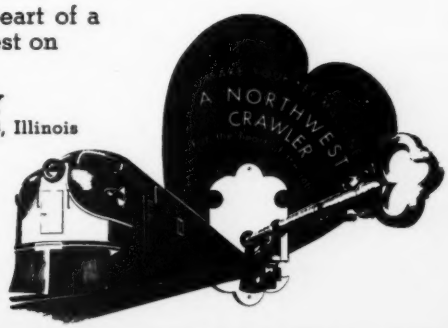
Little wrecking jobs — loads scattered along the right-of-way sometimes beyond the Hook, on big crack-ups or small ones, are easy to handle with your Northwest Crawler as a supplementary wrecker.

Remember, it does jobs no track type machine can do. It goes anywhere on the line, or off. It is easily put on any job you have. Put it over the highway on a standard trailer if the line is blocked or load it and unload it on a standard flatcar under its own power.

Changes in handling equipment from rail tongs and magnet to clamshell or pile driver are quickly made. Conversion from Crane to Shovel or Dragline is made in the field by simply changing booms or buckets. Easy operation without complicated mechanism is assured by the "Feather-Touch" Clutch Control and it is unaffected by temperature or weather. Your Northwest can't be shutdown by control failure.

You can't afford anything but the best for the heart of a Railway Job. Let us help you plan to have a Northwest on every section of your line.

NORTHWEST ENGINEERING COMPANY
1513 Field Building • 135 South LaSalle Street • Chicago 3, Illinois



NORTHWEST

THE ALL PURPOSE RAILROAD MACHINE
SHOVEL • CRANE • DRAGLINE • PULLSHOVEL

Section Gangs like CP-5 Gasoline Tie Tampers

because —

Starting is quick and easy — by pressure on one of the grip handles.

Balance is perfect — weight is centered between grip handles.

View of work is unobstructed, because of compact engine design and slender contour of lower end of tool.

Vibration is minimized in grip handles by air-cushioning of return stroke of free-throw striking piston — machine life is prolonged.

Magneto provides efficient ignition system under all conditions — there are no batteries, thus eliminating costly battery replacements.

Standard two-cycle engine operates on gasoline-oil fuel mixture — oil in fuel provides automatic lubrication.

Write for Bulletin 1943
Maintenance-of-Way Equipment

OTHER CP MAINTENANCE-OF-WAY AND TRACK EQUIPMENT

Air Compressors — Patrol, Crawler, Flanged Wheel Mounted . . . Pneumatic Tie Tampers . . . Reversible Pneumatic Impact Wrenches . . . Wire Brush Machines . . . Boyer Rivet Busters . . . Scalers . . . Spike Drivers . . . Nut Runners . . . Concrete Vibrators . . . Winches . . . Rotary Drills . . . Wood Borers . . . Portable Electric Saws.

CHICAGO PNEUMATIC TOOL COMPANY
General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

For additional information, use postcard, pages 459-460

NEW TRACK CLEANER OPERATES ON TIMKEN® BEARINGS

Identified as their Model "D" Crib Cleaning machine, this new track cleaner built by Railway Maintenance Corporation, Pittsburgh, Pa., completely removes the ballast from the crib, cleans it, puts the clean stone back in the track and deposits spoil or dirt to side of right of way.

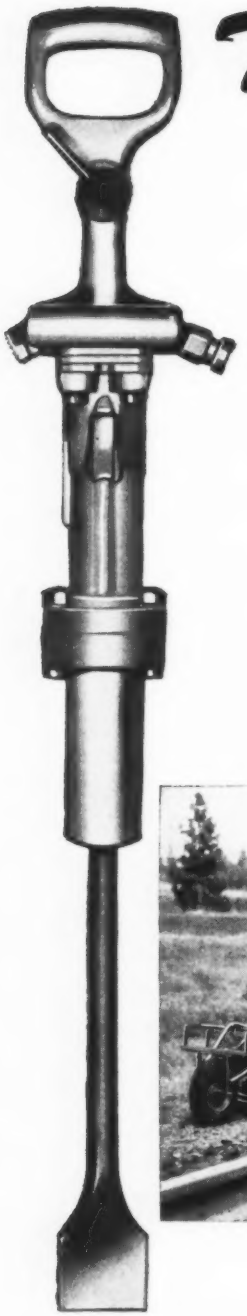
When the photograph was taken, the machine was averaging 1,600 feet of cleaned track per day. This photograph shows how completely and thoroughly the cleaner does its job.

With a total of 18 Timken tapered roller bearings applied in axle journal boxes, digging conveyor sprockets and Brown-Lipe transmission, the machine is well protected against friction; wear; radial, thrust and combined loads; and misalignment of rotating parts. Wherever Timken bearings are used, operating and maintenance costs are reduced, lubrication simplified, delays prevented, machine life extended.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

No matter what kind of equipment you build or buy, if it uses bearings make sure they are Timken bearings with the trade-mark "TIMKEN" stamped on every cup and cone. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address "TIMROSCO".

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◎ AND THRUST ◎ LOADS OR ANY COMBINATION



The TAMPING GUN
THAT USES 40% LESS AIR

This new Ingersoll-Rand MT-4 Tamping Gun saves at least 40% of the air required by other guns you may be using today, permitting operation of more guns from your present compressor equipment.

The MT-4 delivers the same or even more blows per minute, yet it is easier to handle and operate. It is rugged and contains simple parts, cutting your "time outs" and cost of maintenance.

Wire, write or phone your nearest Ingersoll-Rand branch for a demonstration of the new MT-4 Tamping Gun. Ingersoll-Rand is the originator of mechanical tamping and has been serving the Railroad Industry for over 35 years.

Two MT-4 Tampers used with an I-R Spot-Air Compressor.

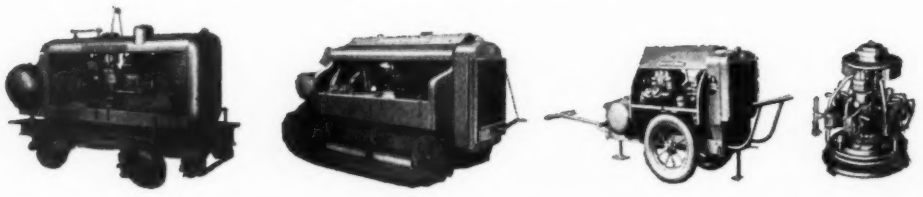
Don't stop with a good Tamping Gun, Use I-R Compressors and Air Tools.

AIR POWER ..... The Key to Lower Maintenance Costs

Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y. 416-11

The Originator of Mechanical Tamping



Compressors for Railway Maintenance Work

For additional information, use postcard, pages 459-460

DUFF-NORTON TRACK JACKS are easiest to operate

ASSURES QUICK, POSITIVE, SMOOTH OPERATING ACTION

Duff-Norton Jacks are favorites with section gangs for maintenance, surfacing and lining of heavy track. Less jacking effort is required—tripping is quick and positive with spring actuated pawl—and these jacks are more economical since all parts except housing and lifting racks are interchangeable. Why not give your workmen and your road the benefits of these high quality jacks—always specify Duff-Norton.

QUICK REFERENCE DATA ON TRACK JACKS YOU NEED!

Jack No.	Capacity Tons	Height Inches	Raise Inches	Base Inches	Head Inches	Foot Lift Ht. Inches	Weight Pounds
117	15	22	13	6½x11	3x3	2	60
117A	15	22	13	6½x11	3x3	2	42
217	15	16½	7½	6½x11	3x3	2	52
617	15	28	18½	7x12	3x3	2	75
517	15	11	5	6½x10¼	3x3	2	40

Write today for complete catalog on Duff-Norton Jacks

65th Anniversary DUFF-NORTON JACKS ESTABLISHED 1883

THE DUFF-NORTON MANUFACTURING CO.

"The House that Jacks Built" • **PITTSBURGH 30, PA.**

THE WORLD'S LARGEST AND OLDEST MANUFACTURERS OF LIFTING JACKS

NO-OX-ID "A Special" is brushed vigorously on rail ends under the head, in the web, on the base, and just beyond the end of the bars.

NO-OX-ID GIVES *Outstanding Resistance* TO RAIL JOINT WEATHERING

With high-speed traffic conditions and the sandblasting effect of grit and debris, the right rail joint lubricant is vitally important. At the end of a three-year official test, NO-OX-ID "A Special" proved to have outstanding service qualities as a lubricant and rust preventive. In addition the test indicated that the NO-OX-ID had many more years of service life and met all the requirements of the job condition.

As added protection, NO-OX-ID Joint Bar Filler, a heavy paste-type material of the desired consistency, toughness, and elasticity, provides an excellent plug for the ends of joint bars, sealing out abrasive materials and preserving the coating.

There's no better formula for low-cost rail joint protection. Investigate the quality features of NO-OX-ID "A Special" and NO-OX-ID Joint Bar Filler, today. Write for descriptive literature.

NO-OX-ID IRON RUST

Dearborn
Reg. U. S. Pat. Off.

THE LEADER IN RUST PREVENTIVES AND BOILER WATER TREATMENT

DEARBORN CHEMICAL COMPANY

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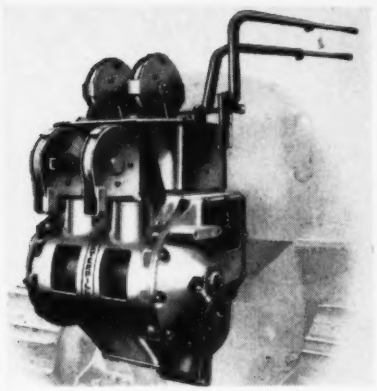
DOUBLE-DUTY . . .



"Caterpillar" Cable Controls are the heart of cable operated equipment. Multiple disc clutches with over 564 square inches of friction surface per drum assure smooth clutch action and long life.

ON THE RIGHT-OF-WAY

The "Caterpillar" Diesel D6 Tractor shown here is working on a lateral drainage ditch along the Great Northern's right-of-way at the Allouez ore-dock yards, near Superior, Wisconsin.

Equipped with a "Caterpillar" No. 6A Bulldozer (angling type) it handles the cut cleanly and moves a lot of earth fast. Note how the heavy clay rolls ahead of the scientifically curved blade.

Mounted on the rear of the tractor is a "Caterpillar" Double-Drum Cable Control that makes it a double-duty tool, used either for 'dozing or for pulling a "Caterpillar" No. 60 Scraper, also owned by the railroad.

Charles S. Hanson, the operator, says: "We do lots of different jobs with this tractor-'dozer-scraper unit. The D6 Tractor has completed well over 3000 hours of work without any major repairs whatsoever."

"Caterpillar" dealers are now in a position to supply you with bulldozers, cable controls and other earthmoving equipment. Now is the time to get your order in.

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

CATERPILLAR
REG. U. S. PAT. OFF.
DIESEL ENGINES • TRACTORS
MOTOR GRADERS
EARTHMOVING EQUIPMENT

3 sure Profit Makers

LIGHT WEIGHT ONE-MAN

One man can produce to the limit with this Disston One-Man Chain Saw for light felling, bucking, limbing and general needs. Light, easy and safe to handle. Starts sure. Powered to do tough work fast. Cuts at any angle, without adjustment. Proved features include instant, handy controls and automatic chain lubrication. 18", 24" and 30" Guide Rails are quickly interchangeable.

A few moments to saw this off

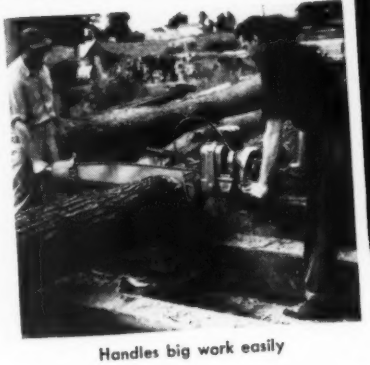
LIGHT WEIGHT TWO-MAN

Here's the Two-Man light weight saw everyone has been waiting for. Combines convenient two-man handling with minimum exertion in cutting bigger trees. New type Chisel Chain (with 30" Rail) makes large felling easy, even on hillsides. Remove handle and you have an efficient One-Man bucking bar. Available with 24" as well as 30" Guide Rail.

Get this done in a minute or less

EXTRA-DUTY TWO-MAN

The saw that handles the big ones right in stride. Full 12 h.p. Toughest ripping and cross-cutting are easy with new self-feeding Chisel Chain—automatically lubricated to save wear. 2' to 7' Guide Rails all quickly interchangeable anywhere. Bucking bar attachment available.



Handles big work easily

DISSTON CHAIN SAWS

with Mercury Gasoline Engines

•

for light work—
big cutting—
every purpose

PRICES
$399.50 up

BOW SAW ENDS PINCHING • SAVES TIME AND TROUBLE

"This is it!" for quick, easy bucking wherever trees fall, on any terrain. The sturdy, slim blade won't pinch in the cut. Saves stops and starts; saves time and money. This 15" Bow Saw with Disston One-Man Chain Saw power is a thrifty team. Bow Saw also available as an attachment, interchangeable with 18", 24" and 30" Straight Rails.

WHEN YOU BUY A DISSTON PRODUCT YOU BUY DISSTON STEEL SKILL and SERVICE

GET A DEMONSTRATION FROM YOUR NEAREST DISSTON DEALER AND GET A BRAND NEW IDEA OF WOOD-CUTTING ECONOMY

HENRY DISSTON & SONS, INC.
541 TACONY, PHILADELPHIA 35, PA., U. S. A.
Canadian Factory: 2-20 Fraser Ave., Toronto 3, Ont.

For additional information, use postcard, pages 459-460

the New TRUE TEMPER RAIL ANCHOR

FEATURES–

1. **Cannot be overdriven.**
2. **Especially adapted to worn and corroded rail bases.**
3. **Ease of application.**
4. **Ease of removal.**
5. **Efficient on re-application.**

Made and sold only by

The American Fork and Hoe Company
Railway Appliance Division

General Offices: Cleveland, Ohio — Factory: North Girard, Pa.

District Offices:
2033 Daily News Bldg., Chicago, Illinois
105 Duane Street, New York, N. Y.

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St. Louis, Missouri
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TRUE TEMPER

ALSO MAKERS OF TRUE TEMPER RAIL FORKS • RAIL JOINT SHIMS • BALLAST FORKS • TRACK SHOVELS SCOOPS • SCUFFLE HOES • AXES • HAMMERS • HATCHETS • SCYTHES • WEED CUTTERS

HERE'S HOW THEY USE for TOUGH

TOUGH CORRUGATED TRANSITE

. . . for buildings that defy weather and corrosion

Both as roofing and siding, these tough corrugated asbestos-cement sheets are cutting maintenance costs to the bone on many railroad buildings such as the diesel engine house above. They need no preservative treatment . . . are proof against rot, rust, fumes and sparks. The large sheets are easy to cut or drill, require only a minimum of framework, are readily fastened to steel or wood.

TOUGH FLAT TRANSITE

. . . for many uses where a fireproof, durable sheet is required

This companion product to Corrugated Transite (see above), offers all of the latter's advantages in a flat sheet material. Non-combustible and possessing Transite's inherent resistance to corrosion, it is adapted to many uses where a strong, durable material in flat sheet form is required. Its easy workability and the speed with which the large units can be erected assure low installation costs.

TOUGH TRANSITE...

jobs on railroads—

TOUGH TRANSITE PRESSURE PIPE

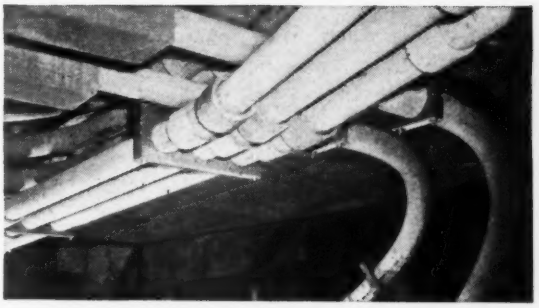
. . . for water lines that resist vibration and corrosion

Resistance to corrosion and ability to withstand vibration are two reasons why Transite Pressure Pipe is keeping water line maintenance costs low on many railroads. Its asbestos-cement-silica composition keeps this pipe strong even when it is exposed to such highly corrosive soils as cinder fills, salt marshes, etc. And its flexible Simplex Couplings absorb the shocks and vibrations of traffic, providing joints that stay tight and safeguard against costly underground leakage.

TOUGH TRANSITE DUCTS

. . . for safeguarding electric cables

Your signal system and power cables get complete protection when you house them in Transite Ducts. That's because these tough asbestos-cement ducts are fireproof, rustproof, rotproof . . . immune to electrolysis . . . and virtually unaffected by corrosive soils and waters. Moreover, their permanently smooth bore reduces friction and abrasion during cable pulling; their light weight and long 10-foot lengths reduce installation costs.



TOUGH TRANSITE SMOKE JACKS

. . . for removing engine house smoke and fumes

It takes a tough product to stand up in this tough engine house service—and Transite Smoke Jacks have been doing just that for many years. Numerous installations have been on the job for fifteen, twenty and thirty years and longer, with little, if any maintenance. In addition to their high corrosion-resistance, Transite Jacks have a streamlined design that provides a high rate of gas removal without eddy currents or "pockets."

JOHNS-MANVILLE JM PRODUCTS

For further information *about any of these Transite Products and their application to your needs, write Johns-Manville, Box 290, New York 16, N. Y.*

Johns-Manville

91 YEARS OF SERVICE TO TRANSPORTATION

The GRADALL *licked this* MUCKLAND DRAINAGE JOB

THE DRAINAGE of the rich mucklands in South Rome, N. Y., has long been a headache to the truck growers, the city, the New York Central Railroad and New York state authorities. Every year flooding of croplands cost many thousands of dollars in damages, —caused costly litigation.

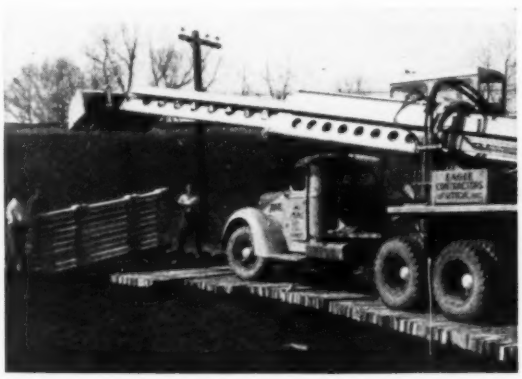
The solution demands a labyrinth of drainage ditches to reverse normal winter flow.

The boggy, miring terrain, formerly marsh wasteland, taxed the ingenuity of engineers and contractors. Gradall with its maneuverability and multi-purpose versatility is answering the problem.

Eagle Contractors of Utica, contractors in the initial phase of the work say, "The Gradall is the only machine we can use efficiently,—and profitably on this work. Gradall is our best money-maker and the best performance machine available today."

Hundreds of other contractors, municipalities, counties, public utilities, and railroads are finding Gradall, with its unique, hydraulic arm-action a fast, precison construction machine. They are using it on jobs, or under conditions which could be served by no other one machine.

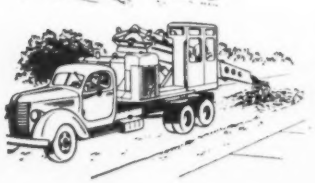
Six miles of ditch in soft muckland is being dug, cleared, deepened, and graded in the big drainage job. The Gradall is the only mechanical machine which can be used economically.

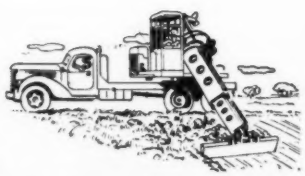


The Gradall builds its own pontoon roadway

In many places the muckland is too soft to support even the well balanced Gradall. In these spots the Gradall lays wooden "mats" before it as it advances, picks them up from the rear and replaces them ahead, and does it fast, too!

Get the facts about Gradall. Write Warner & Swasey, Cleveland 3, Ohio





Gradall Reg. U. S. Pat. Off.

GRADALL DIVISION WARNER & SWASEY Cleveland

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FAMOUS everywhere for premium performance

Wherever ignition failure is too costly to risk . . . wherever operating conditions are extra tough — there you'll find American Bosch *super-powered* magnetos are prime favorites. Backed by years of automotive electrical research and development; these precision, power-packed units bring the utmost in dependable performance. It will pay you to standardize on American Bosch Magnetos for your equipment as so many large users have done — see for yourself why these famous magnetos have long been first choice for America's commercial and industrial engines.

Skillfully designed with a minimum number of moving parts

•

Ruggedly built for extreme dependability

•

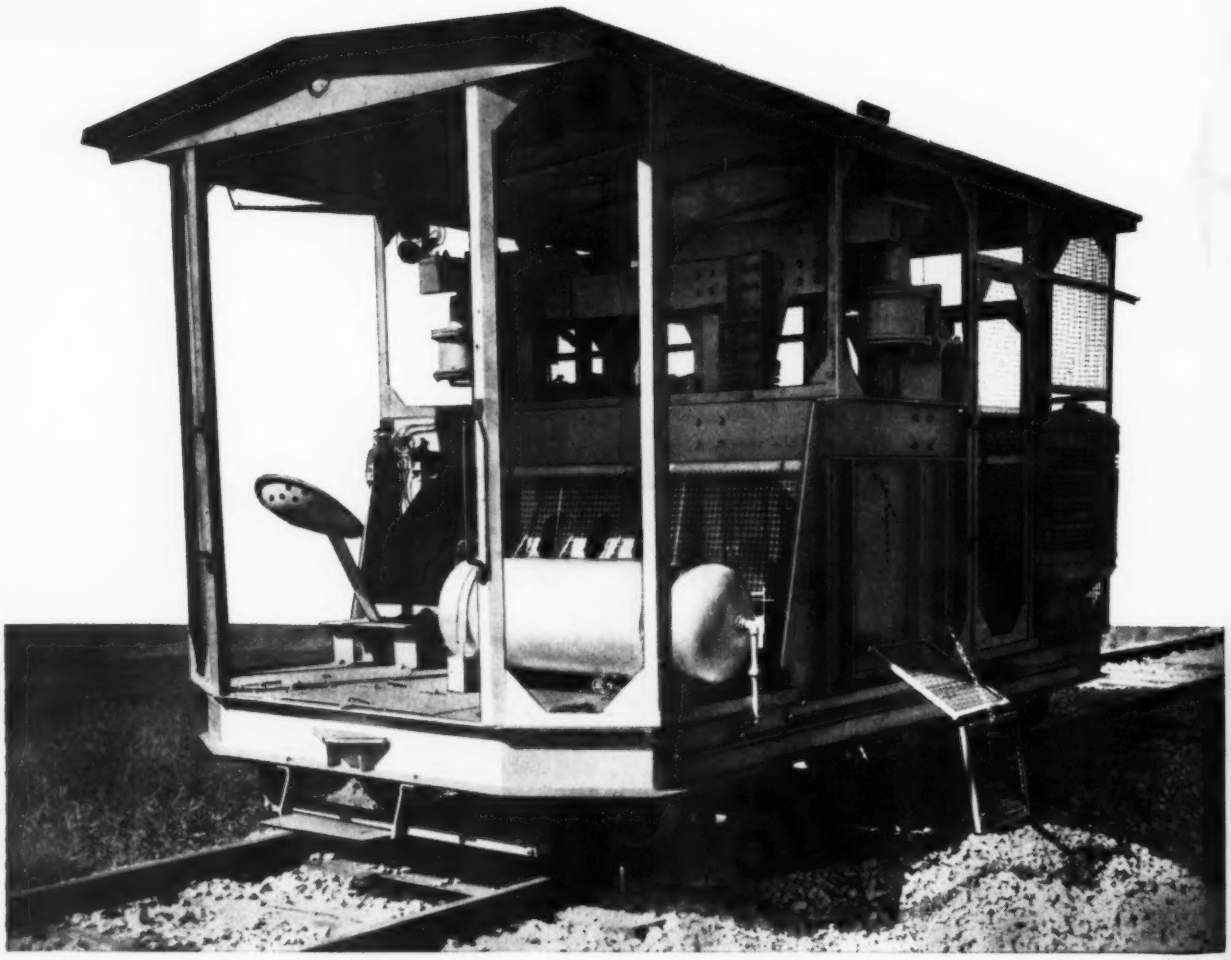
Sizes and types for practically all models of commercial and industrial engines

•

Expert service available the Whole World Over

AMERICAN BOSCH CORPORATION • SPRINGFIELD 7, MASSACHUSETTS

Pullman-Standard



When the Power Track Cribber goes to work, the number of cribs it can skeletonize per day can be measured in *rail lengths* compared with *track feet* by ordinary means. It saves both time and labor.

It operates effectively in all types of ballast, in all track conditions, day or night... travels to and from location under its own power. Lateral wheels and self-contained power jacks permit removal from track in less than five minutes.

On hundreds of miles of track, these machines have paid economy dividends to many progressive railroads. Write for analysis comparing *power* cribbing costs with the cost of gang operations under varied track, ballast, and traffic conditions.

Power Ballaster Division

79 East Adams Street, Chicago 3, Illinois

Pullman-Standard

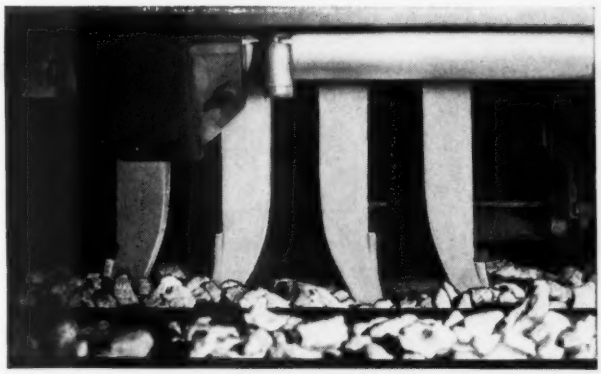
CAR MANUFACTURING COMPANY

Power Track Cribber

CUTS COST OF BALLAST REMOVAL!

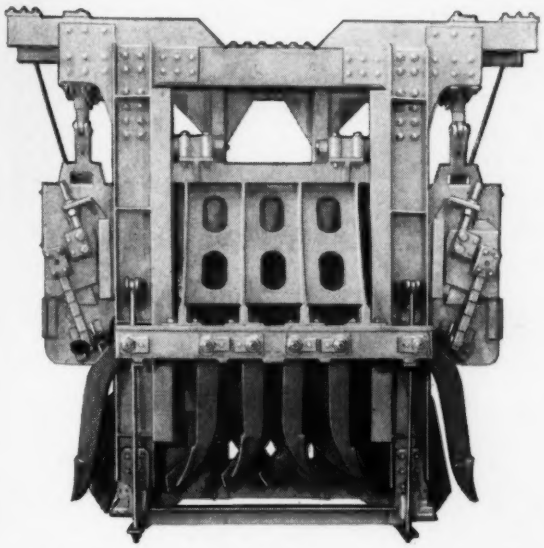
HOW TO MAKE BIG SAVINGS AND GET BETTER WORK DONE FASTER

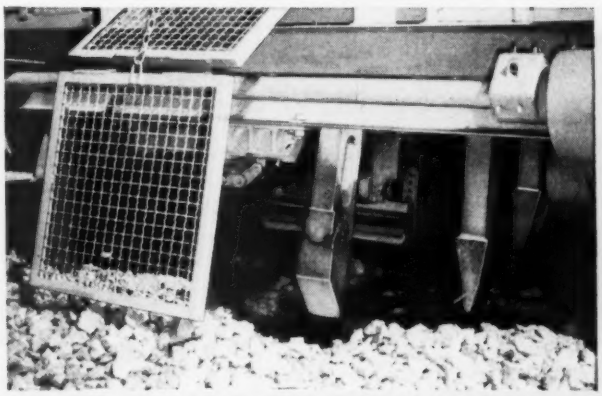
Tremendous power, plus a more efficient digging mechanism, enables these machines to out-perform any other existing method of ballast removal—and at much less cost per crib. Multiple diggers, controlled by one operator, replace many manually operated tools and do a more uniform job. In mechanizing track maintenance, this Power Track Cribber pays off. Performance records prove this.



Impact bars loosen ballast. A view along the track under a Power Track Cribber, showing impact bars which work as "picks" in crib ahead of the digger bars. Thus, ballast is pre-loosened to facilitate action of the diggers.

Machine Power Saves Man Power



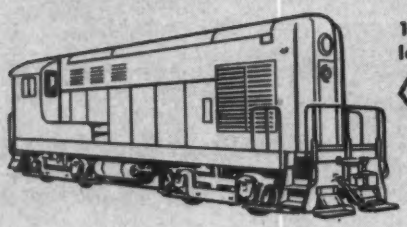


This view shows digger bars in position between ties, with pointed "impact" bars preparing the crib ahead. Diggers contact the ballast serially, moving it progressively from track center to ends of crib. Depth of digging may be varied for different track conditions and heights of rail.

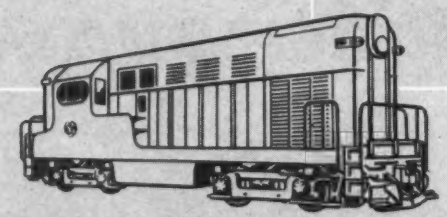
DROP-HEAD OPERATES WITHOUT REACTION ON CRIBBER CHASSIS

No snubbers, springs, or shock-absorbing devices are needed to save wear and tear on the machine. 6,200-pound drop-head is power-lifted —falls by gravity. The entire force of the falling head is spent in breaking up the ballast. This is the only cribber employing this pile-driver principle.

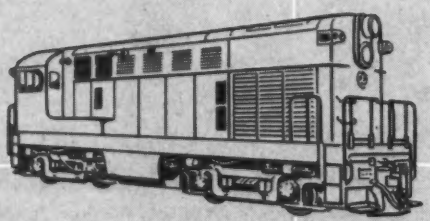
Ready for resurfacing. Crib thoroughly cleaned out to the desired uniform depth.



1000 hp. 120 ton switching locomotive



1500 hp. 120 ton suburban and general purpose locomotive



2000 hp. 125 ton heavy duty locomotive

Diesel Locomotives by FAIRBANKS-MORSE for every yard and road service

The recent advent of the line of "Consolidation" Locomotives —combined with the well established Fairbanks-Morse locomotives for yard transfer and suburban service—makes Fairbanks-Morse the source of the *world's most complete line of diesel locomotives.* For every service, for every ruling grade and speed, there is a Fairbanks-Morse Opposed-Piston Diesel that best meets your requirements. Fairbanks, Morse & Co., Chicago 5, Ill.

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FAIRBANKS-MORSE

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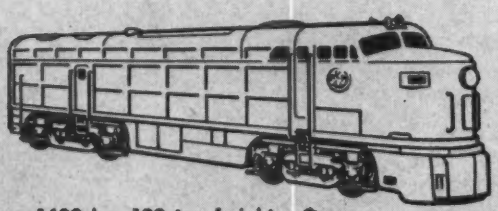
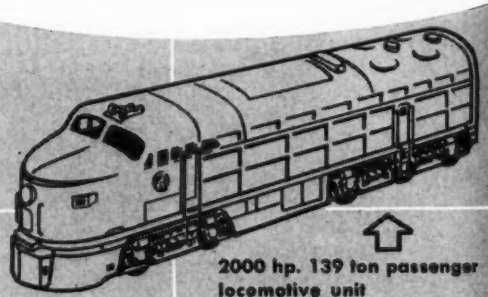
PUMPS • GENERATORS • RAILROAD MOTOR CARS and STANDPIPES
FARM EQUIPMENT • MAGNETOS

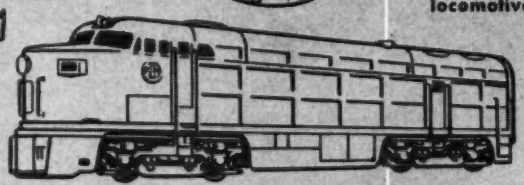


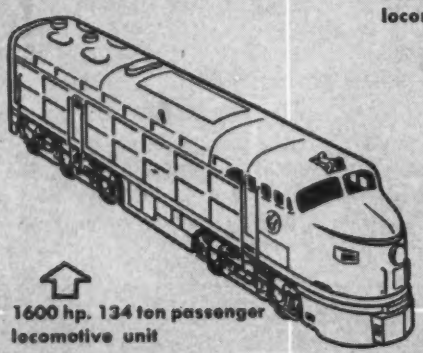
1600 hp. 120 ton freight locomotive unit



2000 hp. 139 ton passenger locomotive unit

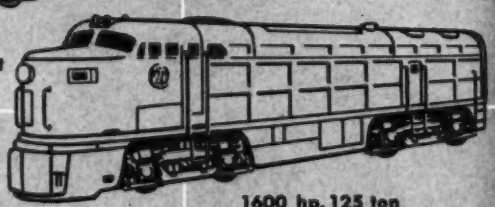
2000 hp. 123 ton freight locomotive unit





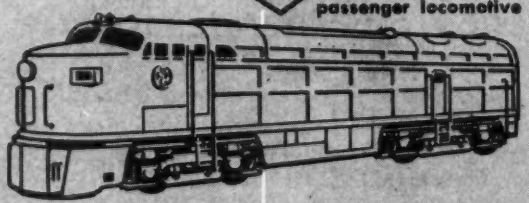
1600 hp. 134 ton passenger locomotive unit

2400 hp. 126 ton freight locomotive unit



2400 hp. 142 ton passenger locomotive unit

1600 hp. 125 ton combination freight & passenger locomotive unit



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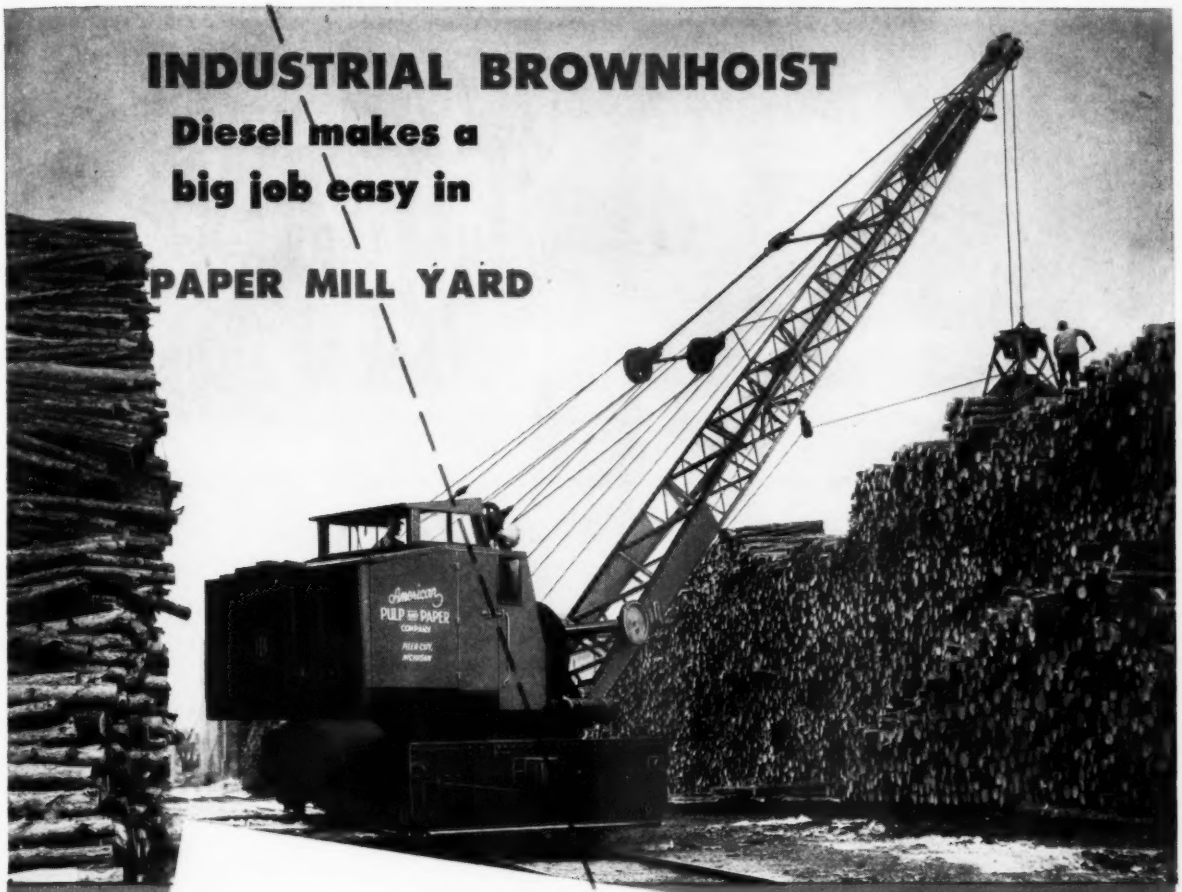

THE American Box Board Company, American Pulp and Paper Division at Filer City, Michigan, makes the loading or unloading of thousands of cords of pulpwood an easy task with this INDUSTRIAL BROWNHOIST Diesel Crane. The operator enjoys full-circle 360° vision in the exclusive Monitor-type cab and Diesel motor operation *gives maximum economy with a minimum of maintenance.* On railroads, in steel mills, shipping centers, chemical plants and in the yards of scores of other industries BROWNHOIST cranes are saving time and money in the handling of materials. *Write today for complete information.*

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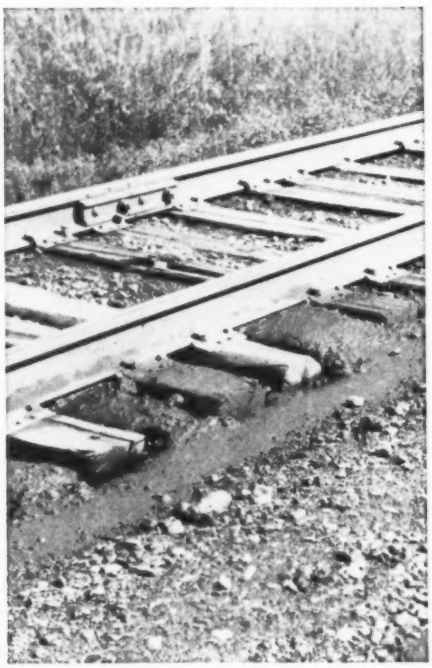
You can't sue a subgrade for lack of support



When water-filled subgrades are guilty of non-support they cost you plenty in excessive maintenance. Then the only way to keep roadbeds firm, smooth and stable is to drain the water out and keep it out. You can do this with ARMCO Perforated Pipe.

Efficient, economical subdrainage comes easy with ARMCO Pipe. Unskilled workmen quickly join long lengths with simple band couplers. There are fewer sections to lay—fewer joints to assemble. Installation goes fast and labor costs are low.

Your ARMCO Subdrainage System assures long, trouble-free service. ARMCO Pipe has proved strength to resist crushing or cracking under the impact and weight of heavy loads. There is no danger of disjointing or malalignment from shifting soils or severe frost action. Clogging is no problem. Scientifically placed holes collect unwanted water and drain it off along the pipe invert.

Use ARMCO Pipe for installing complete railway subdrainage systems, or for patching up trouble wherever it occurs. Then you can be sure of a firm, dry foundation under your roadbed. You'll save maintenance dollars and have a safe, smooth track with fewer "slow orders." Write for complete information. Armco Drainage & Metal Products, Inc., 1195 Curtis Street, Middletown, Ohio.

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ARMCO PERFORATED PIPE

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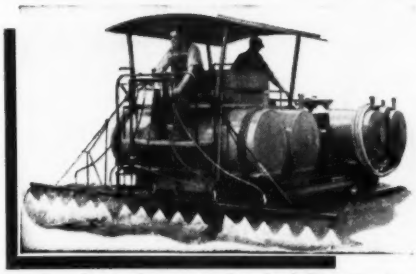
Manufacturers of Railway Maintenance Equipment Since 1917



WOOLERY Combination SPRAYER and WEED BURNER

Permits chemical spraying or burning weeds as desired. Spray width is 18 feet for chemical sprayer. Standard PB unit at opposite end burns swath 15 feet wide.

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WOOLERY MODEL PBS WEED BURNER

Three burner type. Burns swath 15 feet wide per trip . . . burner arms swing out to 25 feet second trip. Burner arms controlled from cab. Two man operated. Burns all types of weeds.

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- For over thirty-two years, railroad men have acclaimed Woolery equipment for rugged design and efficient service. Now more than 125 railroads in the United States and foreign countries are using Woolery equipment.

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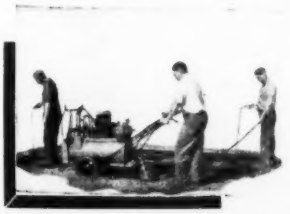

WOOLERY JOINT OILER

Self propelled off-track type. Powered by a 4 cycle, air cooled engine. 25 gal. tank with heater allows heavier type lubricants to be used for longer lasting oiling. Three man operated. Oils up to 1½ miles of track per hour.

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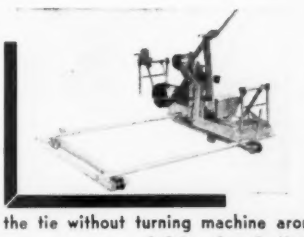

WOOLERY MODEL N TIE CUTTER WITH UNDER CARRIAGE

Allows tie removal with little or no ballast disturbance and no deep trenching. Cuts ties in three sections for easy removal. Under carriage permits cutting both ends of the tie without turning machine around.

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WOOLERY MACHINE COMPANY

MINNEAPOLIS — Pioneer Manufacturers of — MINNESOTA

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RAILWAY WEED BURNERS • MOTOR CARS • TIE CUTTERS • TIE SCORING MACHINES • RAIL JOINT OILERS • CREOSOTE SPRAYERS • BOLT TIGHTENERS

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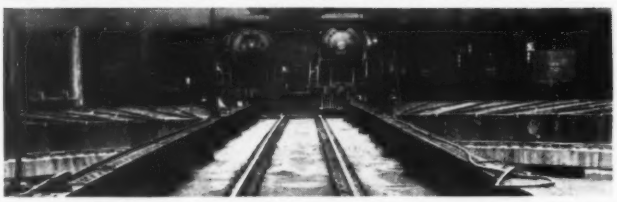
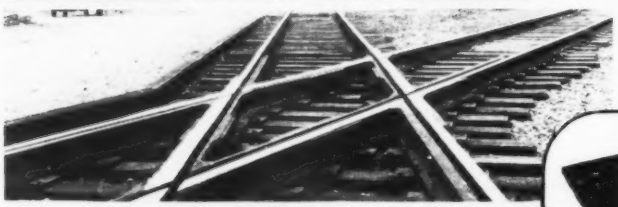
The physical properties of Fabreeka, — great strength; minimum permanent set; controlled resiliency; high damping value and long life make Fabreeka the ideal material for use beneath crossings, cross-overs, and switches; on curves; in turntables; and on steel and concrete deck bridges.





At *crossings, cross-overs,* and *switches* Fabreeka pads between ties and tie plates increase the life of manganese points by cushioning impact blows from the wheels. Fabreeka's slow recoil from "compression" insures cushioning without bounce. Mechanical wear of ties is also reduced.

On *curves,* the mechanical wear on ties from plate cutting is eliminated. The frequency and expense of regauging track is greatly reduced. Fabreeka pads keep spikes from lifting.

In *turntables,* Fabreeka reduces impacts through application under end tie plates; under end tie plates of approach tracks; over bearings of turntable trucks; and under tie plates of circular rail.

***Used between the rail and the steel or concrete deck of bridges,* Fabreeka eliminates the use of ties and ballast. This reduces the foundation depth required, yet leaves proper clearance for underpass, and yields sizeable savings in excavating and concrete work.**

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IT PAYS

to Specify Fabreeka

FABCO TIE PADS

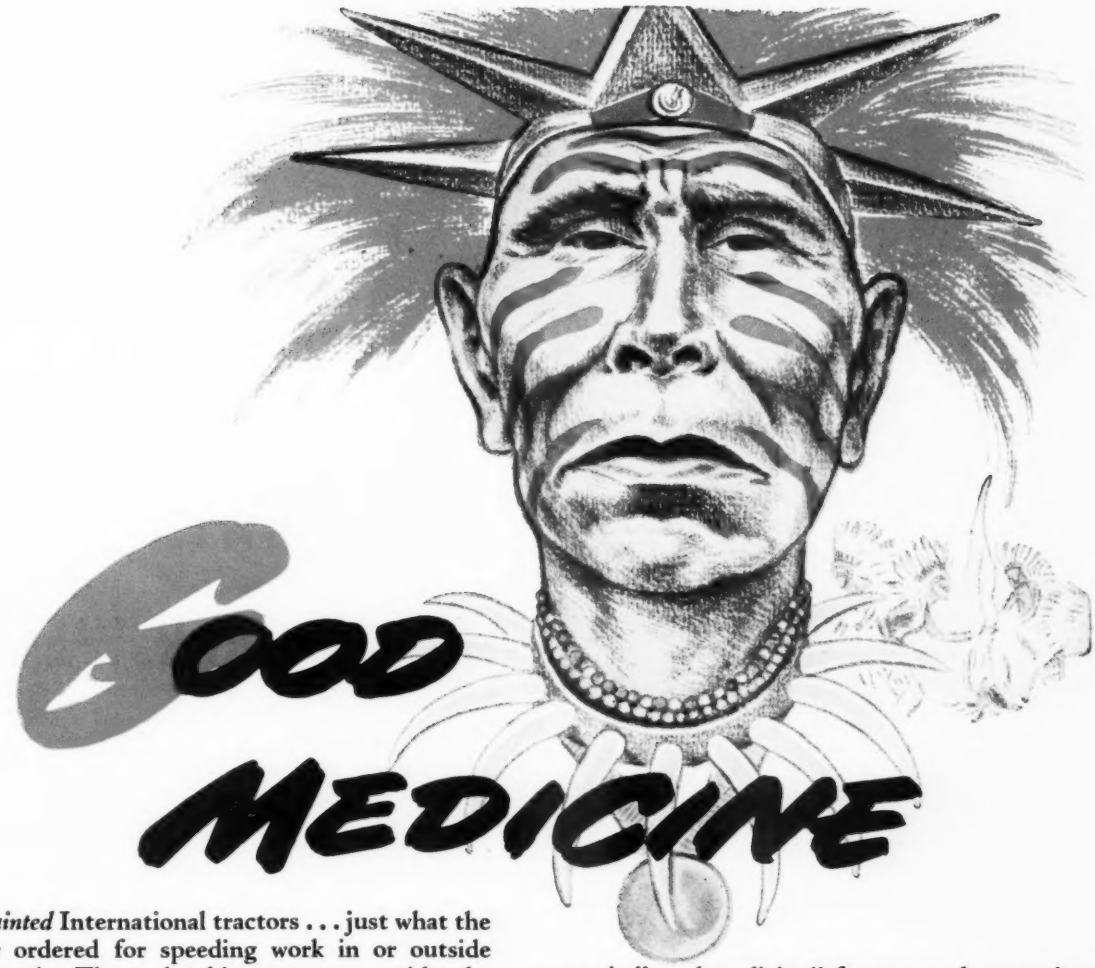
For Open Track

Fabco Tie Pads reduce the mechanical wear of ties, and are especially recommended for use on ties in curves, bridges, and switches where tie life is relatively short and the cost of renewal, high. Withstand extreme temperatures, moisture, mildew, sand. Spikes do not have to be driven down a second and third time.

Longer Tie Life with Fabco Tie Pads
- resilient
- no set — no loose spikes
- no renewals required

Made By The Makers of Fabreeka

For additional information, use postcard, pages 459-460



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INTERNATIONAL HARVESTER COMPANY • Chicago

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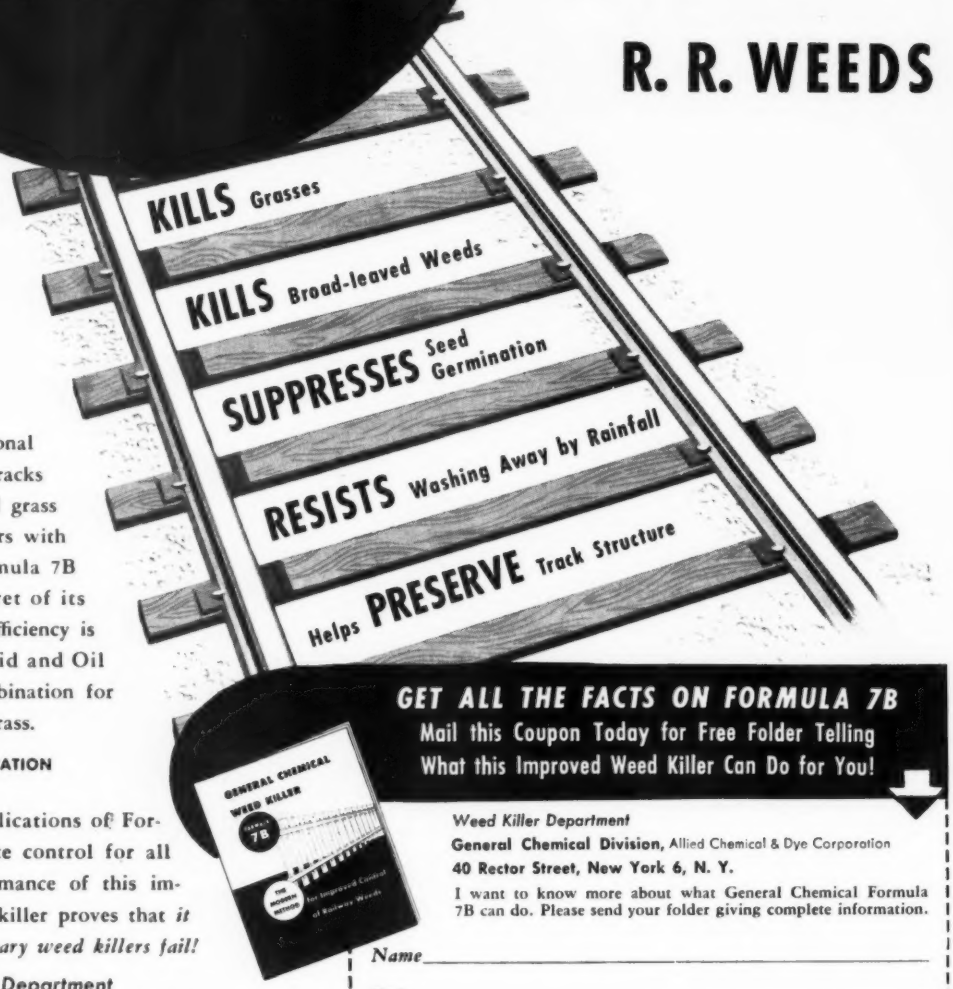
DOES A *BETTER* JOB CONTROLLING R. R. WEEDS

GENERAL CHEMICAL WEED CONTROL



Not just short-term seasonal relief . . . but cleaner tracks with ultimate weed and grass *sterilization* can be yours with General Chemical Formula 7B Weed Killer. The secret of its powerful long-lasting efficiency is its Trichloroacetic Acid and Oil formula—the ideal combination for controlling weeds and grass.

"CUSTOM-PLANNED" APPLICATION SERVICE AVAILABLE

"Custom-planned" applications of Formula 7B offer complete control for all conditions. Past performance of this improved, *different* weed killer proves that *it gets results where ordinary weed killers fail!*

Weed Killer Department

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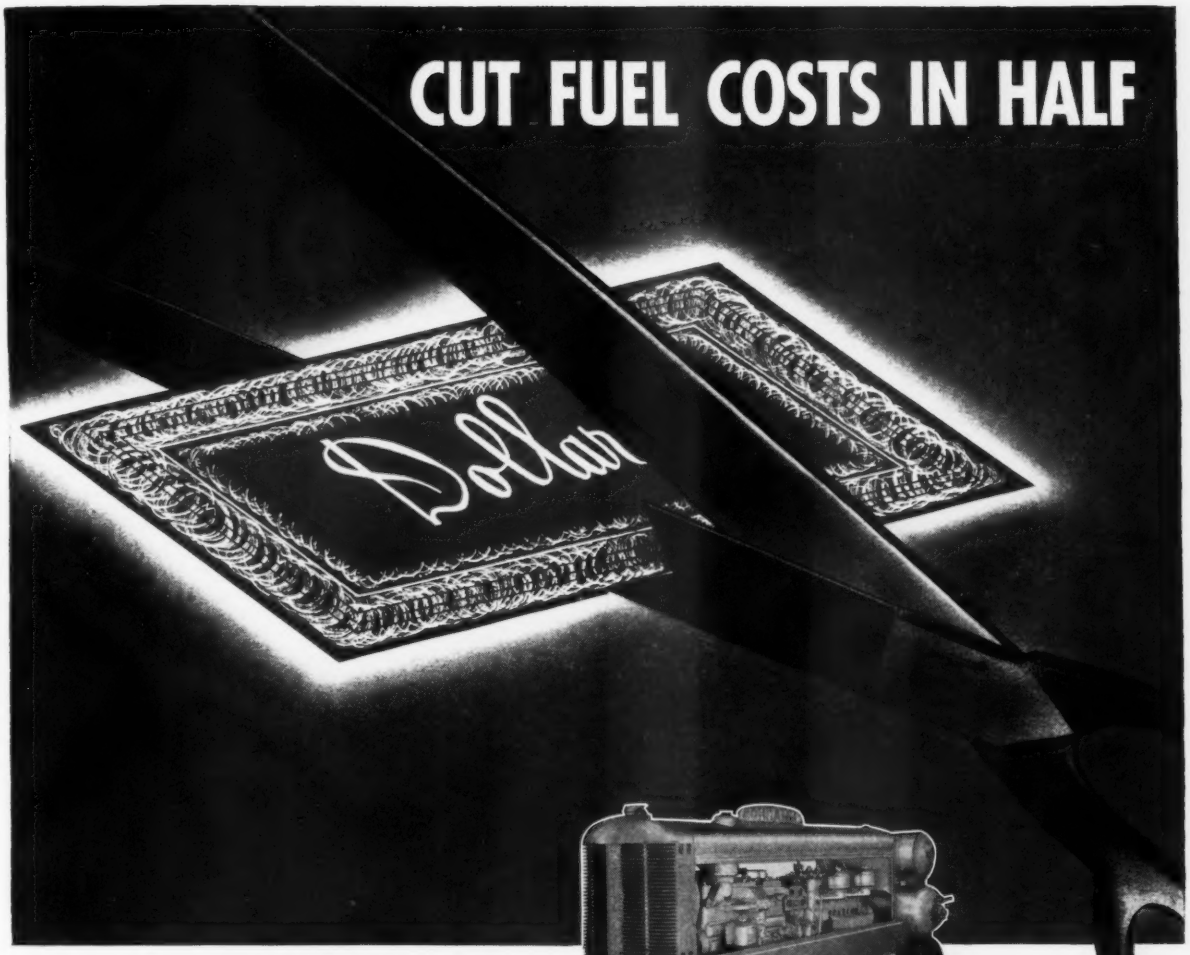

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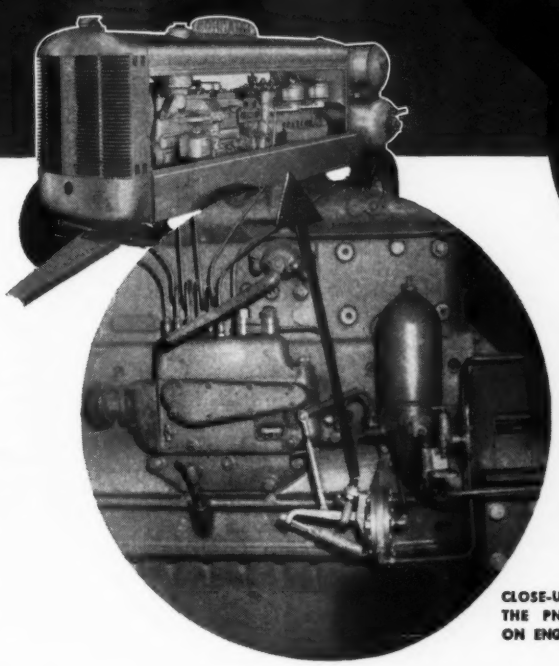

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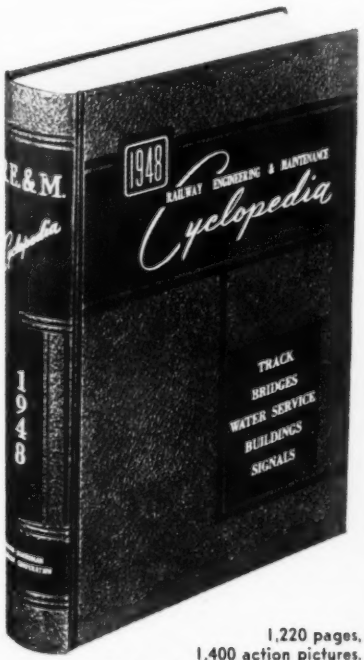

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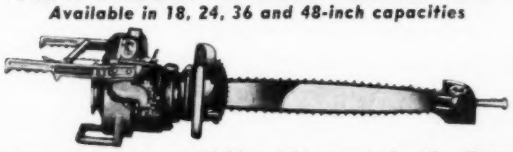

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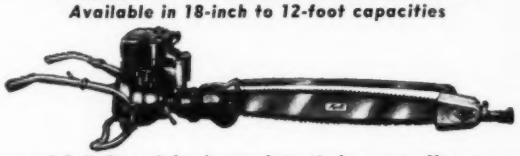

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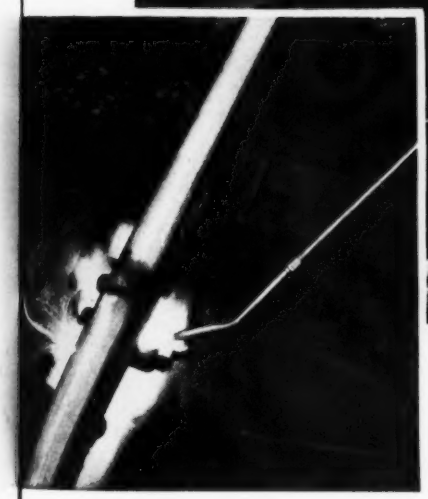

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May, 1949

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No. 245 of a Series

Railway Engineering and Maintenance

SIMMONS-BOARDMAN PUBLISHING CORPORATION 105 WEST ADAMS ST. CHICAGO 3, ILL.

Subject: A Drastic Proposal

May 1, 1949

Dear Readers:

Postmaster General Jesse Donaldson says, in effect, that, under second-class postal privileges, you have been getting Railway Engineering and Maintenance delivered to you too cheaply, that second-class mail matter, generally, does not anywhere near pay its way, and that the rate it and other similar publications bear should be increased.

Mr. Donaldson could be right, to a degree, on all three counts, but the trouble arises from the fact that he is proposing in a bill before Congress, not to increase second-class rates by 25 per cent, nor to double or triple them, but to quadruple them. What would you do if you were in our place? Well, that is just what we're doing—opposing any such increase, convinced that it would be harmful to the country, harmful to business generally, of little help to the Post Office Department, and disastrous to many business publications.

The bill in question, HR 2945, calls not only for a complete change from the present method of making second-class postal charges, which itself would bring about a large increase, but it would impose heavy surcharges based upon advertising content—up to 100 per cent for issues carrying more than 75 per cent advertising—the surcharges to be assessed upon the entire content of the publication—editorial and advertising. Furthermore, it designates as advertising descriptions of new products, naming the manufacturers, and certain other material always accepted heretofore as editorial matter.

Testifying before committees of both houses of Congress, officers of the Associated Business Papers, of which group we are a part, have pointed out that the bill defeats the basic purpose of the favorable second-class postage rate set up by Congress in 1879 for paid-subscription, educational publications to foster the wider distribution of such publications; that, as drawn, it is unrealistic and a monstrosity of levies and surlevies; that it is based upon a false premise as to the large deficit in the Post Office Department; that it would require substantial increases in subscription and advertising rates; and that it is confiscatory to the extent that it would price completely out of business many of the smaller publications in the trade and business groups, and would cause serious injury to the larger publications.

Withal, it is pointed out by representatives of the business press, that the proposed new rates would deprive large segments of business and industry of trade journals, such as Railway Engineering and Maintenance and other Simmons-Boardman publications, to which these groups have looked over the years for vital information, in both editorial and advertising pages. Furthermore, it is contended that, if adopted, the new rates would drastically reduce postal receipts without appreciably lowering Postal Department expenditures.

We are not opposed to a reasonable increase in postal rates, but for all of the foregoing reasons we are opposed to Bill HR 2945, convinced that it will be hurtful to the country, to business and industry, to you men on the firing line, and to us and many other publishers. We are sure that you agree with us.

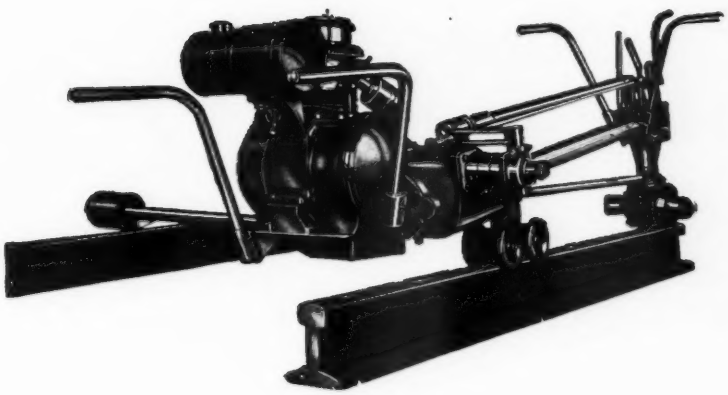
Sincerely,

Neal D. Howard

Editor

NDH:ag

It's Got What It Takes



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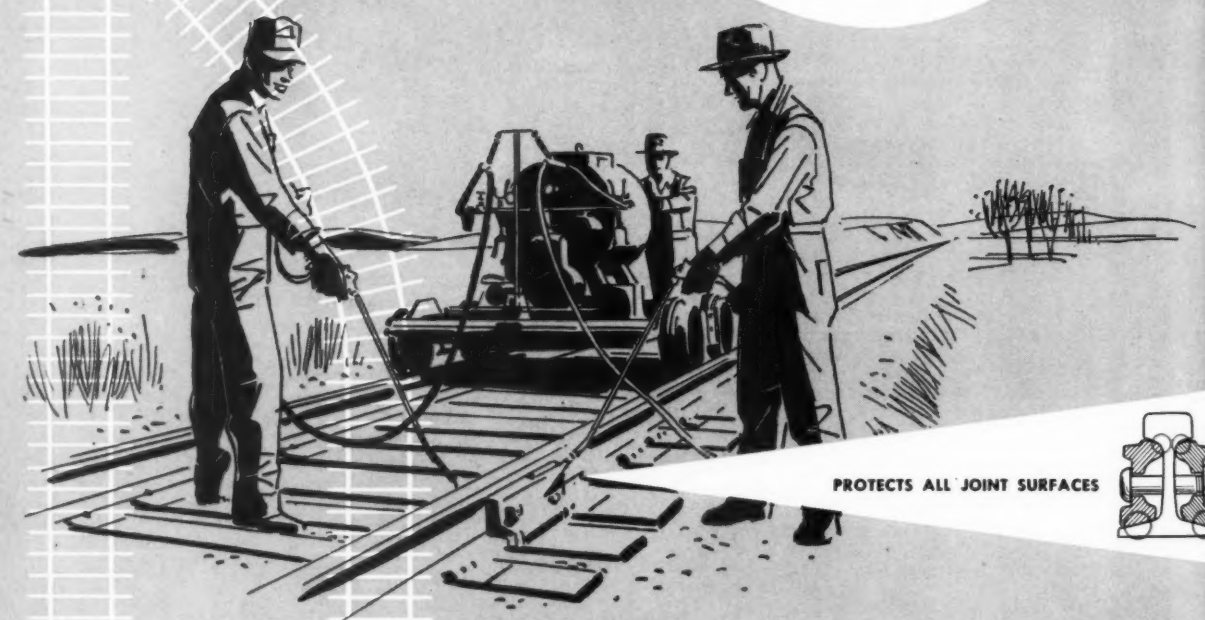

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Railway Engineering and Maintenance

NAME REGISTERED U. S. PATENT OFFICE

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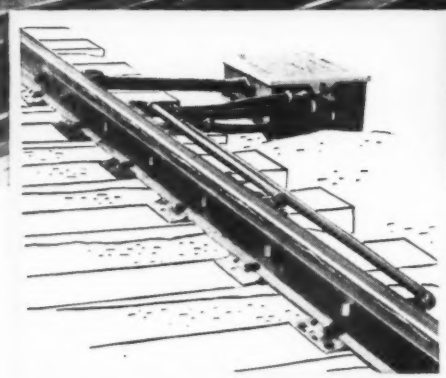
Racor model 4000

RAIL LUBRICATORS



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RACOR

The 5-Day Week—

Calls for New Heights in "Human" Engineering

The consummation of the 40-hour, 5-day week agreement, on March 19, between the railroads and the sixteen non-operating brotherhoods representing nearly 1,000,000 employees on the railways, has been hailed in many quarters as an important achievement. Strong differences were settled without a work stoppage, which threatened, and, while employees gained handsomely, the railroads also gained concessions from the original demands that will permit them to "stagger" the shorter work-week to meet "operational requirements," and thus escape heavy overtime payments for work necessary on Saturdays and Sundays.

It was, as it is well that it should be, a victory for both parties in dispute, but, unlike employees, who won more leisure time and a substantial increase in hourly rates, the railroads, in victory, are confronted with a revolution in operating practices, wage rates and rules that presents new problems of great magnitude. Furthermore, according to estimates of the carriers, they will be faced with increased wage costs of $640,000,000 annually, starting 1950, unless by dint of increased efficiency on the part of themselves and their employees, the lost hours of productive work under the shorter work-week can be largely offset.

September 1, the effective date of the new five-day week is only four months away. Much must be accomplished in this short period in revising hundreds of local agreements on the various roads and in setting up new work organizations to meet the new conditions. At the same time, much more must be done if the railroads are to be prepared to put into effect on September 1, or at the earliest practicable date thereafter, effective measures to minimize the amount of work that must be done, and increase the efficiency with which the remaining work can be done. That such measures are searched out and developed is the responsibility of the supervisory officers in each department affected—which includes all such officers in the engineering and maintenance-of-way and structures departments.

On most roads, system, district and division engineering and maintenance officers have already been called into consultation on these matters. In some cases several formal or informal meetings have been held to explore the problems and develop possible solutions. Much, no doubt, has already been accomplished; new goals set; tentative plans made. But, attacked on an individual road or system basis—is that enough?

Sensing the need for coordinated inter-road thinking on the many new problems presented, *Railway Engineering and Maintenance*, early in April, sent a questionnaire to a number of chief engineering and maintenance-of-way officers of representative roads to ascertain their thinking as to the new problems that will be presented to their departments, and concerning those measures that are contemplated to overcome these problems. Answers to the questions raised are summarized in a feature article in this issue, and will, no doubt, prove interesting and helpful to engineering and maintenance officers generally.

But is this enough? Is there not a much larger job of collaboration between roads to be done—and promptly—to insure the full exploration and interchange of ideas? Is there not need for the various roads, as was done during the agreement negotiations so successfully, to pool their thinking and plans; indeed, clarify and unify their interpretations of the various terms of the agreement, in the interest of starting off on the most practicable and efficient footing, and of creating the greatest harmony among

employees of like rank throughout the industry?

The article referred to in this issue suggests unmistakably the desirability of such collaboration. Several of those questioned frankly admitted that they could not fill out the questionnaire at the present time. Others said they were not in a position to answer specific questions. Still others were anything but definite in their comments, and throughout the answers as a whole there was striking divergence of thought and opinion, on even some of the most basic questions. Indeed, added to the apparent indecision in some quarters as to what best should be done to meet the many complicated problems presented, there is evidence of confusion of thought as to what can be done within the terms of the overall and local agreements.

This may be a natural situation, to be expected in view of the newness and magnitude of the problems involved, but it is no less an unhealthy situation, and one that cannot be solved completely and satisfactorily until there is closer collaboration between the various roads. The time is short; the stakes are high. In the problems presented more than physical engineering is involved, important as that is. There is an opportunity for "human" engineering of a high order—engineering affecting the most valuable and costly element that enters into the properties of the railroads—man power.

BE AN INVENTOR—

Still Plenty of Room for Progress

CAN IT BE that maintenance-of-way supervisors are habitually overlooking opportunities for developing improved devices and methods that would help the forces under them to do a better job and which conceivably could result in financial gain for themselves? On the surface it may appear that such opportunities have been pretty well exhausted; that since many fine minds have been engaged on this problem for a long time they must have thought up just about everything that is worthwhile. This is a misleading and even dangerous state of mind for it results in a "what's the use" attitude which is the enemy of initiative and constructive thinking and presents a barrier to progress of any kind.

If proof is needed that there are still many possibilities for developing improved practices, consider the accomplishments of a roadmaster on a mid-western line. Among his creations is a track tool that is being manufactured and marketed by a supply firm on a royalty basis. Another is an ingenious device that he has developed and installed on his motor car for automatically indicating variations in the track gage. A third is a labor-saving device for nipping up ties while they are tamped. He has devised other machines, and also a number of new and different methods of doing work, which are proving effective on his territory.

This man is aided by a mechanical turn of mind, but what is more important he manages to maintain a fresh and critical attitude toward his work, and refuses to subscribe to the belief that long or widespread usage automatically qualifies a method or machine as the best that can be developed. Another characteristic of this roadmaster that has been an important influence in spurring him to develop better devices and methods is the habit of being constantly alert for new ways of saving labor.

Within a few months, when the maintenance-of-way departments go on the 40-hr. week, hourly rates of pay of the employees in this department are going to rise sharply. Then the need for labor-saving methods and devices will be greater than ever. Every supervisory officer, and even foreman, can help satisfy this need if he energetically applies himself to the task. Every contribution, however small it may be, will help individual roads to meet this new problem. And rewards will not be lacking for those who make the contributions. Increased recognition and advancement to better positions are among these—and then almost anybody can use a royalty check now and then.

SAVING MINUTES—

Means Dollars in Maintenance Work

THERE ARE two principal ways of getting more production per man in railway maintenance work. One is to make the fullest use of those measures that result in more output per man-hour of time actually worked. The other is to do the things that are necessary to insure that each gang will spend a maximum proportion of the working time actually at work. In view of the large increase in hourly wages that is soon to take effect, the time has come when maintenance supervisors may find it profitable to review present practices in the latter regard with the thought that even a few additional minutes added to the time actually spent working is a goal that is worth devoting considerable time and effort to achieve.

This comment does not apply alone to the more common measures that are being used to reduce lost time. Presumably careful attention has been given on most roads to the matter of adopting transportation arrangements that will get their gangs to work without delay. It is likewise assumed that the possibilities for using the so-called "detour" system have been thoroughly explored. However, it should be mentioned that in its most effective form, the detour system involves a great deal more than routing trains around a single major operation, such as rail laying or surfacing; properly used, this system contemplates that as many operations as possible will be concentrated in the stretch of "dead" track.

Aside from these and other more common measures there are a number of less widely-used expedients that are worthy of careful consideration under present and future conditions. For instance, the practice of having work equipment operators show up on the job a few minutes earlier than the remainder of the gang will eliminate the possibility of lost time due to the men standing around waiting while engines are being warmed up. Again, what are the possibilities of reducing waste motion on the part of section gangs by the kind of supervision that will specify in advance exactly where each foreman is to work? Undoubtedly there are numerous other steps that can be taken to reduce lost time—even if only a little here, and a little there.

Minutes mean dollars—in some cases many dollars—and hence the time and effort required to devise ways of saving them may well prove to have been well spent.

Theoretically, the reduction of the work week from 48 to 40 hr. will have the same effect as if one man in each six were eliminated, as illustrated by the "blanked" worker in the picture

By September 1 of this year the maintenance departments of the nation's railroads must have plans perfected for putting their employees on a basic working schedule of five days a week. For an industry that is essentially a seven-day business, the adoption of the 40-hr. week, even for the maintenance forces, presents difficult and complicated problems. But already a great amount of thinking has been done and plans are beginning to take definite shape. Compiled from information obtained through a questionnaire, this article summarizes the thinking to date on 14 large roads.

THE 40-HR. WEEK— What It Means to the Maintenance Man

• Maintenance-of-way workers may be looking forward with anticipation to the greater leisure they will have under the 40-hr. week, but to the maintenance officer the necessity of planning for the shortened work week is proving to be a headache of the type that requires more than aspirin for relief. When the railroads consented to abide by the recommendation of the emergency board appointed in the so-called non-operating employees wage-and-hour dispute, and to put a 5-day, 40-hr. work week into effect for such employees effective September 1, 1949, the stage was set for what many consider to be the greatest upheaval that has occurred in the maintenance departments for at least 30 years. Even the problems that had to be solved when the work day was reduced from 10 hr. to 8 hr. in 1918 are considered simple compared to those imposed by the impending 40-hr. week, because on the previous occasion no complications were introduced by a reduction in the work week.

In planning for the 40-hr. week maintenance officers must decide if the section gangs are to work a straight five-day week, Monday through Friday, or whether their work is to be staggered in order that some of the crews will be on duty on Saturday to handle emergencies. In either instance there is the problem of track inspection over the week ends. Should provision be made for such inspection on Saturday, or is it practicable to discontinue inspecting track on that day, thereby, in many instances, having two consecutive days during which there will be no inspection? How are positions to be "covered" where there must be some one on duty six or seven days a week? These are only a few of the questions that must be answered. There is also a problem of economics involved. With all employees working one-sixth less time for an hourly wage that will give them their former take-home pay plus an increase of seven cents an hour, how can this lost time be made up without substantially increasing the amount of money spent on maintenance?

What 14 Roads Are Planning

Throughout the country maintenance officers are working independently on these problems. In some cases there has been contact between officers on neighboring lines, but by and large there has been little interchange of information between different roads concerning the best procedure to follow regarding the various problems raised by the 40-hr. week. With the thought of fulfilling, in part, the need for a clearing house of information on the subject, a questionnaire was sent to a limited number of representative roads so chosen as to give a cross-section of the thinking of maintenance officers generally. Detailed replies were received from fourteen roads. These replies, along with supplemental information obtained from other sources, are summarized in this article.

A considerable number of the replies made it clear that in many quarters the thinking and planning for the 40-hr. week are still in the preliminary stage, that few final decisions have been made. On the other hand a great deal of thinking has been done, many tentative decisions have been arrived at, and the planning on some lines is rapidly crystallizing into a definite policy.

All the questions raised in the

Two consecutive days of idleness will present a problem at labor camps

questionnaire fell into one of two broad classifications, i.e., they dealt either with the problems of organization involved in putting the shorter work week into effect, or with the measures to be taken to offset the greatly increased cost of labor that will prevail after it becomes effective. The replies to the questions in the two categories will be discussed in the order mentioned.

Staggering the Work Week

One question inquired if it is planned to stagger the work of section gangs so as to have some of these gangs on duty from Monday through Friday, and others, Tuesday through Saturday—and, whether, if this is to be done, some gangs are to be called to cover emergencies or to inspect track on territories other than their own. The answers reflect considerable differences of opinion on this point and not a little confusion. The differences of opinion seem to stem mainly from the relative importance attached to the need for having at least some section gangs on duty on Saturday to handle emergencies. The source of the confusion is uncertainty regarding whether a staggered work week can be negotiated with the local employee groups in view of the oft-repeated language in the agreement to the effect that, so far as practicable, the days off shall be Saturday and Sunday.

The question of whether the staggered arrangement can be adopted is also governed to some extent by existing local agreements, some of which give the section gangs seniority on specific territories. For instance, will it be permissible, under a staggered work-week arrangement, for a gang to do emergency work on an adjacent section without complications arising with the regular crew on that section?

An important factor in revising local agreements to conform to the national agreement, not only regarding the question of staggering section gangs but all other issues raised by the 40-hr. week, will be the so-called "40-Hour Week Committee", which is established by the national agreement. Composed of six representatives each from the railroads' and employees' national negotiating groups, the "40-Hour Week Committee" has been endowed with authority to make binding decisions in disputes arising from efforts to revise individual contracts in accordance with the national agreement. Decisions made by the "40-Hour Week Committee" will become effective on September 1, and disputes arising after that date will be processed through the National Railroad Adjustment Boards in the usual manner.

Replies Reflect Uncertainty

In view of the clouded situation surrounding the question of whether to put into effect a staggered arrangement for section gangs it is not surprising that the replies to the questionnaire reflected considerable uncertainty and indecision regarding this matter. Only four of the roads replying stated definitely that the staggered arrangement is planned, although a fifth road said that it is considering this plan, and a sixth stated that it preferred to stagger primary and secondary main-line sections, implying that it would do so if this plan could be negotiated with the employees.

Staggering of Section Gangs

Four of the replies indicated that there would be no general staggering of section gangs but that this practice would be employed to a limited extent. One of these four simply stated that the organization would remain unchanged, with "some" gangs going on the staggered basis, two stated that the work week would be staggered only for certain main-line sections or in important terminals, and the fourth said that this practice would be followed only in "special circumstances". The remaining four roads, for one reason or another, plan to work all their section gangs a straight five-day week.

The main reason given for not adopting the staggered basis is the conviction that this could not be done without running into complications involving the organizations. However, the reason given by one road is the fear that the staggered arrangement would result in "divided responsibility".

Other Gangs

The replies indicated in general that extra gangs would be worked the straight five-day week, with no staggering, although in one case the proviso "except in emergencies" was added. On one road consideration is being given to the possibility of organizing a small floating gang for each roadmaster's district, which possibly would be "used on an overtime basis where track conditions justify extra work." In several cases concern was expressed regarding the problems that will be presented when extra-gang men housed in labor camps will have two consecutive idle days on their hands, although apparently no decisions have been reached regarding what measures will be effective in holding them in the camps over week ends.

Judging by the replies to the questionnaire the general practice regarding the bridge and building and

water service forces will be to work them five days, Monday through Friday, except in emergencies, although one road says that its bridge and building forces will be staggered and another stated that some of its water service gangs would be worked on the staggered basis. One road feels that it will be necessary in large terminals to "split" its water service gangs to provide protection on the off day and to reduce overtime.

Engineering Personnel

Field and office engineering department personnel will, in general, be put on the straight five-day week, although one road said that "some staggering of working days may eventually result;" another said that skeleton forces would be maintained in the chief engineer's and division engineers' offices on Saturdays; and a third replied that "having someone on duty in the division engineers' offices, perhaps the division engineers themselves, depends on arrangements made in the general office." Another exception to the five-day week on this third road will involve engineering forces on construction jobs whose working schedule will depend on that of the contractor. In several instances the implication was that the present six-day week will be continued for the engineering forces on the grounds that these forces are not affected by the 40-hr. week agreement.

Present thinking regarding the working schedule of the engineering forces applies on most roads also to clerical personnel.

What Plans for Supervisors?

Roadmasters and their assistants on many roads are going to participate in the benefits of the 40-hr. week, according to the answers to the questionnaire. Of the roads submitting replies, at least six plan to put their supervisors on the five-day week. On another the working schedule of employees in this group will be "as required by service", and on at least three lines the plan is to continue the present six-day work week.

Of the roads that plan to put supervisors on the five-day week three intend to stagger their working days in order that some of them will be on duty on Saturday, and to make this possible one road plans to furnish its roadmasters and supervisors with assistants. On one of the roads planning to maintain the present schedule for its roadmasters the reasoning is that these employees consider themselves a part of management, and on that basis are willing to accept all the responsibilities that accompany the seven-day week.

Week-End Track Inspection

The question "How do you plan to handle week-end track inspection?" elicited almost as many different answers as there were replies. To be sure five of the roads replying are not planning to inspect their tracks on week ends, but on two of these lines some qualification was involved. On one of them, track inspection activities "will be confined to regular working days except where abnormal conditions require a staggered work week or overtime in emergencies." On the other, while there will generally be no track inspection on week ends, "a few sections having unusual conditions will be patrolled on Saturday or Sunday by section foremen."

Wide Variation in Plans

Week-end track inspections are planned on seven of the roads submitting replies, but there is wide variation in the manner in which these inspections will be made. On one road it is contemplated that the track supervisors or their assistants will ride over the territories on the sixth or seventh day; on another the plan is for the roadmasters and their assistants to handle the track inspection on Saturdays; and a third plans also to use its supervisors for this purpose, but if this is not practicable it will use relief men.

On two roads the week-end track inspections will be performed by "staggered forces", although on one of these lines such inspections are planned only for certain localities and busy yards. A road that makes inspections on week ends at certain locations plans to continue them, using relief men where possible. On a road that now has track inspectors on much of its territory the plan is to add two additional employees in this category and to keep all of the inspectors on duty over the week ends, giving them their two days off at other times.

Information obtained from one road indicates that it was first proposed that roadmasters be required to make the inspections on Saturday, but this proposal was rejected on the grounds that, being part of management, roadmasters should not be required to perform this task. This road employs the supervisor method of motor-car inspection, and the suggestion has been made that, to obtain a Saturday inspection, the necessary overtime should be paid to bring these inspectors back to headquarters on the sixth day (Saturday).

Changes in Organization

What revisions in the present organization of the maintenance forces will be put into effect as a result of the 40-hr. week? On 12 of the roads participating in the study no major changes are contemplated in the track forces. The other four lines contemplate changes of varying degrees of importance. Two of them are considering revisions that will mean a reduction in the importance of, and amount of work performed by, the section forces, and a corresponding increase in the activities of extra gangs. One of these roads anticipates "greater employment of extra gangs and regional gangs for specialized operations," with a resulting reduction in the amount of work to be performed by the section forces, while the other is giving consideration to a plan for lengthening the sections and relieving these gangs of all but the most minor spotting and policing tasks. This plan calls for the creation of additional floating gangs to absorb much of the work now done by the section gangs.

In contrast to these contemplated revisions involving a reduction of the amount of work to be done by section gangs is the plan of one road to lengthen the sections in some localities and to provide more men in the gangs to give a larger and more efficient organization under one foreman. At the same time there would "in all probability" be a reduction in the amount of work performed by the extra-gang forces. The reply of the fourth road that is considering changes in the organization of its track forces merely stated, without amplification, that "some additional track sections will be necessary".

What About Seven-Day Jobs?

Among the questions was one inquiring what was to be done about positions, such as crossing watchmen, coaling station operators, signal maintainers, and bridge tenders, which require six or seven-day coverage. In practically all cases the answer was that relief men would be employed to secure such coverage, although one reply was that the staggered work week would be used where possible, "but overtime will increase and make the installation of labor-saving devices more attractive." On another road the plan is to

establish relief positions where such positions can be worked five days each week. Where less than five days per week is required for relief, the thought is that the requirements can be met by extra employees or by "composite jobs".

A plan proposed on one road is to attempt to get the men to accumulate days off and to take a number of them at once rather than two days each week. For instance, an employee might work continuously for 25 days, and then take 10 days off all at once. The contention is that it would be simpler to have relief men fill in for a week at various points, rather than jump from place to place to handle two-day assignments.

One of the questions inquired whether, in the event additional track forces would be required, the present gang organizations would be enlarged or additional gangs organized. Three roads answered this question with the comment that no additional track workers were to be added. The majority of the remaining replies indicated that any necessary enlargement of the section forces would generally be accomplished by adding men to the present gangs, but that the most common policy regarding extra forces would be to add additional gangs if expansion of the work force was found necessary.

How Make Up Lost Time?

The measures to be taken to compensate for the one-sixth fewer hours that will be worked by present employees under the 40-hr. week was the subject of another question. Practically all those replying indicated that the more intensive use of the machines now owned would be a factor in this connection, although several implied that existing equipment was already being used to capacity and that little additional help could be expected from this source.

The purchase of additional machines as a means of overcoming the loss of man-hours, and to meet the increased pressure for economy that is certain to ensue, was another matter on which close unanimity of thought was expressed, although there were various degrees of emphasis behind the comments on this question.

One chief engineer was emphatic in expressing the belief that further mechanization can be carried out to great advantage. He said that their are still large opportunities for economies, and that, under the greatly-increased hourly wages that will be in effect after September 1, many machines not now used extensively will pay for themselves in as little as six months. This road is especially interested in promoting the development of machines designed to reduce the amount of hand labor required in making tie renewals. Its studies of the possibilities of mechanization under the new wage scale has led to the decision to defer making a sizeable expenditure for a maintenance improvement project in favor of the purchase of additional track machines. This decision was motivated by an analysis which showed that an expenditure for machines of one-third the amount required for the maintenance improvement would produce a comparable saving.

More Large Machines Expected

All except one of those replying to the questionnaire look for the development and more extensive use of large-capacity machines to increase production and reduce man-hours. The operations most frequently mentioned in this connection include tamping, ballasting and ballast cleaning, grading and ditching, and track laying and surfacing. Also, a decided preference for off-track machines was indicated.

The question on the use of large-capacity machines drew a number of comments that throw considerable light on the thinking of chief maintenance officers as it has been conditioned by the impact of the 40-hr. week. This thinking can be summed up in the comment of one man to the effect that "undoubtedly the increased cost of doing work which will be brought about by the 40-hr. week will result in the development and more extensive use of all types of machines in all categories of work." Another said that the "more extensive use of machinery and development of machinery for work not mechanized at present are of first importance." A third, stating that "higher wages always have the effect of justifying larger investment in labor-saving machines," went on to point out that many operations in connection with reballasting are still being done by hand and that equipment for handling ties is needed.

Again with varying degrees of emphasis, eleven of the maintenance officers answering the questionnaire expect that increased mechanization of the section forces will be a factor in compensating for the loss of man-hours. However, several of the replies implied that no marked development in this direction was expected as a result of the shorter week, and others revealed that most important developments are expected in the mechanization of extra gangs.

Will Employment Increase?

The replies made it plain that the hiring of additional employees as a means of compensating for the loss of man-hours will be kept to a minimum. In fact, a flat "no" was the reply of four maintenance officers to a query on this subject. Most of the other replies were characterized by such comments as "only where necessary"; "will be kept to an absolute minimum"; "not unless emergencies arise or only in cases of positions which must be covered six or seven days"; "will obviate as far as practicable"; "will do our best to avoid"; and "to a limited extent."

A similar tenor was noted in the replies to a question as to whether the loss of man-hours would be made up to some extent by working present employees overtime. It is apparent that overtime will be avoided wherever possible, and will be used only in emergencies or where it will be necessary as a last resort in conforming to the requirements of the 40-hr. week. The general view toward the use of overtime was pretty well expressed in the words of one chief engineer who said that "no use will be made of assigned overtime unless relief employees cannot be obtained on seven-day jobs", but that there "probably will be an increase in incidental overtime since it can be anticipated that there will be more emergency calls."

Can Work Be Reduced?

Will there be a reduction in the amount of work done as one means of making up for the loss of man-hours? The consensus on this question is that the amount of work done would only be reduced as a last resort. Four of the replies stated definitely that no reduction in maintenance operations was contemplated. Most of the others qualified their answers in various ways. One road plans no curtailment of work "unless it can be done without affecting the general condition of the roadbed." A fair proportion of those replying are depending on increased efficiency of their forces to make it unnecessary to curtail operations or to increase expenditures to keep the amount of work at the present level. One chief engineer pointed to the testimony of the officers of the employee organizations to the effect

that the "employees would perform the same amount of work in five days they formerly did in six days," and added, "we expect them to make good."

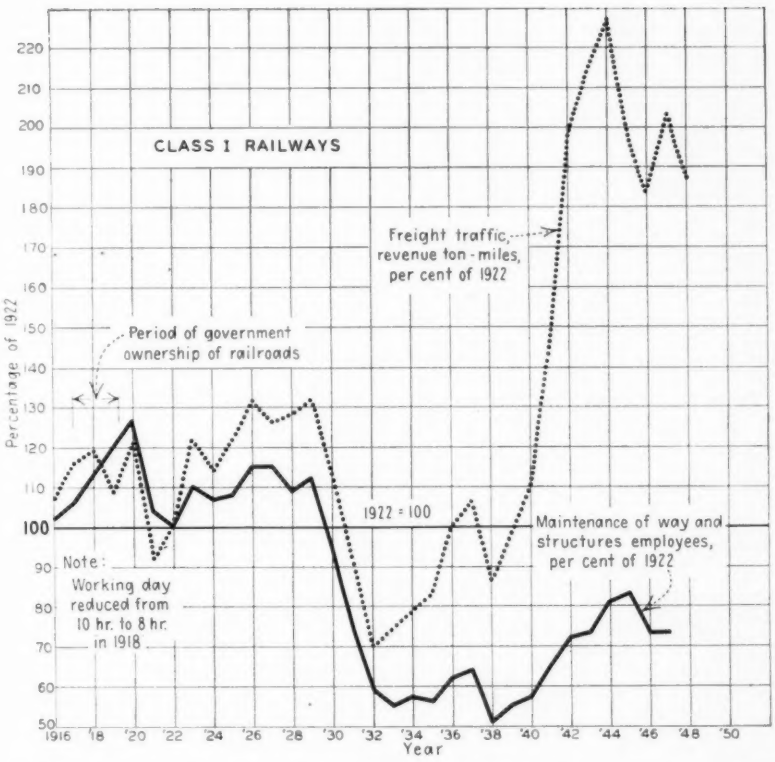
Another chief engineer expects that there will be no reduction in the amount of work done "unless such reduction could be made without lowering our standard of maintenance." Still another said that there was no possibility of reducing the amount of work to be done, but that an attempt would be made to perform all work more permanently. Only one reply indicated without qualification that some work reduction was contemplated. It said that "certain classes of work now performed will, in all probability, be curtailed where possible." However, another road expects that it may be necessary to reduce the amount of work done to the extent that increased efficiency and other expedients will not make up for the lost time.

The Economic Considerations

The foregoing discussion of the counter-measures to be employed to compensate for the time lost indicate that this is to be accomplished largely by measures, such as more intensive mechanization, that will result in increased efficiency. Since these measures are basically intended to promote efficiency and reduce costs, they come under the economic phase of the subject as mentioned at the outset of this article. But increased mechanization is not the only weapon that is being groomed for the battle to keep costs down after the effective date of the 40-hr. week. A query regarding what means, other than the use of machines, can be used to increase the productive capacity of labor under the shorter week, brought answers which indicate that some intensive thinking is being done regarding this problem.

More Supervision Probable

More intensive supervision was frequently mentioned as a means of getting more production per man-hour. One road is planning to employ assistant roadmasters and "to establish somewhat of a track inspector system", the object being to obtain closer supervision of the foremen and to eliminate lost time on the part of section gangs in "trying to find a place to work." Several indicated that a better class of labor would now be attracted to maintenance work, and one road expects to get increased production by weeding out those "who don't produce." Other expedients that are under consideration as means of getting greater production include the stabilization of the track forces, the adoption of measures to reduce travel time, the use of stronger and more serviceable materials, improved organizations and working methods, and better planning of operations through cost studies.



Will the 40-hr. week result in an increase in the number of employees in railway maintenance work? If so, will the increase be permanent or will there eventually be a downturn? While it doesn't answer these questions, this chart comprises an interesting study of the trend of employment in the maintenance group since 1916. For one thing it shows that there was not a sustained rise in employment following 1918 when the working day was reduced from 10 hr. to 8 hr. For another it shows that employment in the 'Forties, when traffic reached record proportions, was a great deal less than in the 'Twenties, when traffic was at a much lower level. Since official figures on railroad employment are not broken down by groups prior to 1922, the curve up to that year is based on the trend for all non-operating employees. It was for this reason that 1922 was used as the basis of comparison for this chart

Opinion is divided on whether a more permanent track structure should be adopted to help overcome the increased cost of labor that will prevail under the shorter week. Nearly half of those replying answered this question in the affirmative, but a number expressed the opinion that they either considered present construction adequate or were satisfied with present programs under which heavier rail is being laid. However, the consensus seems to be that the 40-hr. week will accelerate the trend toward heavier rail, better ballast, more ties per rail length, better drainage, and roadbed stabilization by grouting and other means.

Long-Term Results

The final question asked for an expression of opinion regarding whether it is expected that the 40-hr. week, with the counter-measures that will be necessary, will eventually result in the employment of fewer workers than at present. Seven of those replying think that eventually fewer employees will be required, but several of them are convinced that it will be a long time before this happens. Most of the others are equally convinced that little further reduction in employment is to be expected. As a matter of interest in this connection a chart is presented to show the trend of employment in the maintenance-of-way department since 1916, and taking in the year (1918) when the 10-hr. day gave way to the present 8-hr. day.

Part II

Track Stabilization—

• As pointed out in Part I of this article, there are three component parts of the track structure that should be stabilized—both separately and collectively. In the following description of stabilization methods, we will start at the top and work downward. This procedure is for descriptive purposes only. In actual practice it would probably be much better to start at the bottom of the roadbed and work upward.

In such a stabilization program, the first procedure should be accurate tie spacing. The next should be the tightening of all joints, and the inspection and correction of any loose spikes. All unsound ties should be renewed.

Ballast Stabilization

Ballast stabilization is very important and may be accomplished in several different ways, depending on the character of the ballast itself, and whether or not conditions permit raising the track on new ballast. If the track can be raised six inches or more, one of the best ways of stabilizing the ballast is to apply a sufficient amount of new ballast to make this raise. When the track is to be raised on new ballast, it is quite important that the old crib ballast be removed to tie bottoms, or preferably several inches below. After the application of new ballast the track must be lined and surfaced.

When it is impossible to raise the track, ballast stabilization may be obtained by a thorough renovation of the old ballast. In this renovation, or cleaning, process, the crib ballast should be cleaned to a depth of 3 or 4 in. below the bottoms of the ties, the shoulder ballast to the roadbed surface, and the center-ditch ballast to a depth of 8 to 12 in. below tie bottoms.

In any railroad track structure the rails and ties practically float on the ballast and are unanchored to the roadbed itself. The rails and ties are held in position only by reason of their weight and the frictional resistance of the ballast surrounding the tie. Obviously, if this weight, or the frictional resistance, can be materially increased, there will be considerably less probability of any tie movement and, consequently, a higher degree of track stabilization.

Increasing Frictional Resistance

The weight of the ballast surrounding the ties may be increased by increasing the quantity. This means full cribs and fairly wide and heavy amounts of ballast at the tie ends. Another method of increasing the weight of ballast is by the use of denser material. The weight of ballast surrounding ties may also be increased by proper gradation of the ballast particles themselves. Regardless of the size of any ballast aggregate (if the size is uniform), there will be open voids in the mixture of approximately 42 per cent. If the ballast aggregates are graded properly between the maximum and minimum sizes, these open voids may be reduced to 36 per cent, with a corresponding increase in weight per unit volume.

The frictional resistance within ballast itself and against the surfaces of the ties tends to minimize the movement and to keep the ties in a stable position. A method (proposed by the author) whereby both the weight per unit volume and the frictional resistance are materially increased is to fill up the open voids of the ballast with the proper grade of sharp sand. If the open voids are approximately 40 per cent, the aggregates will weigh approximately 100 lb. per cu. ft. Into these open voids approximately four-tenths of a cubic foot of sand may be added without increasing the overall volume. As the sand also weighs approximately 100 lb. per cu. ft., the resultant mixture will weigh 140 lb. for the same volume.

Action of Sand in Ballast

That the addition of sand to ballast greatly increases the frictional resistance of the ballast particles may be demonstrated easily by filling a box with polished steel balls. If a rod is introduced into these steel balls, it will be found that they may be stirred and moved quite easily. Now add sufficient sand to fill the voids and any attempt to stir or move the balls will fail because of

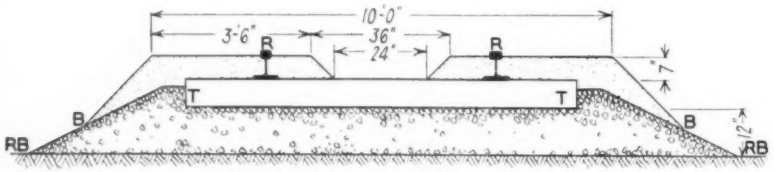


Figure 4—Sketch showing the method recommended by Mr. Protzeller of applying sand to the surface of crushed stone or slag ballast. Note that none is put in the center of the track. The photographs below show a test application of sand by this method

A test section of sanded stone-ballasted track immediately after the sand had been applied. However, no sand should have been applied along the center of the track

A SCIENTIFIC APPROACH

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Supplementing the discussion of track and roadbed loadings and stresses presented in Part I of this article, this installment deals with methods of stabilizing both the track structure itself and the roadbed. The outstanding features proposed include the use of sand to increase the weight and functional resistance of stone or other coarse ballast, and the placing of sand in the roadbed, by either of two methods, to overcome excessive contained moisture. Both methods of placing this sand are described

the greatly increased frictional resistance.

After almost any kind of ballast has been in service for a short time a wet, slimy mass of mud collects directly under the tie bottoms. This slimy mud acts as a lubricant between the wood of the tie and the ballast materials and permits tie movement even when the tie is carrying a considerable load. Sand added to ballast aggregates collects under the tie bottoms and maintains a uniformly dry seat, assuring a high frictional resistance.

Obviously, the addition of sand to ballast in the above manner can only be made where new ballast has been applied and the track lifted, or where the crib, shoulder and inter-track ballast has been thoroughly cleaned. When sand is added to the ballast in the track, it is important that very little sand be added at the tie centers, because, under traffic vibrations, such sand at the center of the track will tend to pack under the tie and cause center-binding.

Figure 4 shows how this sand should be applied. It requires a special type of distribution plow that will uniformly distribute the sand as shown. The sand applied on the top of the ballast will quickly work under the tie ends and downward through the ballast section and into the roadbed surface. Actual experiments have proved that this method of stabilization is very beneficial for crushed stone or slag ballast, providing a dry and well-stabilized ballast section. The sand for this type of ballast stabilization should possess sharpness and a minimum amount of "fines" that might have a tendency to collect in the journals of passing trains.

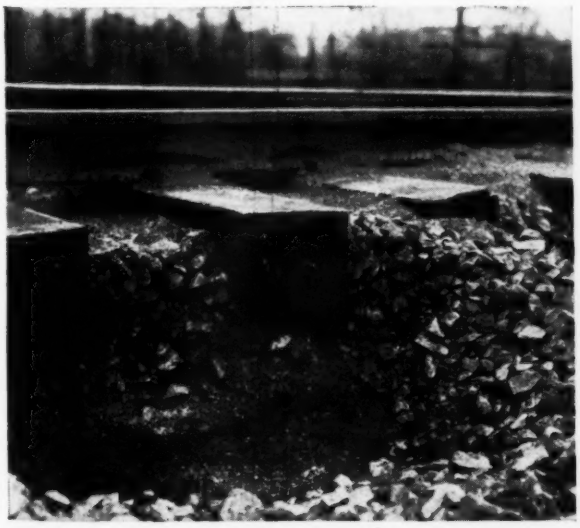
*Mr. Protzeller, as noted in the news columns of this issue, died on April 6.

Roadbed Stabilization

Thus far we have described the action, reactions, and complex forces acting on the roadbed surfaces from the head of the rail down to the ballast base. From this description it is obvious that moving forces act on the top surface of the roadbed, and that these forces must continue downward for varying distances, depending on the character of the roadbed itself. If the roadbed happens to be solid rock, then it is naturally stabilized, and needs no further consideration. However, if the roadbed consists of clay, soil, and various other earthy materials, which is usually the case, it will probably require considerable attention to improve its strength and stabilize it.

Forces in Roadbeds

There are two main forces that tend toward the destruction of any roadbed. The first of these is the advancing pressure wave ahead of each truck of rail vehicles. This force acts very similarly to a huge rolling pin on a mass of dough, tending to force the roadbed material in the direction of the train movement. The most destructive tendency of this force is to cause small weak spots in the roadbed to grow and increase in size, both longitudinally and laterally. The other destroying force is the vibratory force caused by the ties being raised in advance of the moving vehicle, and then being forced downward



In 10 days after a second application, the sand had penetrated through the ballast voids to the extent shown in this picture

This photograph shows how the sand applied to the top surface of the ballast has made its way completely beneath the ties

under the center of the moving weight or truck. The entire roadbed structure takes a terrific vibratory walloping with the half of a giant football (see Part I) pounding the roadbed surface with considerable force at the extremely rapid rate of 90 blows per second.

Removing Water from Roadbed

When water is present in the roadbed, and it usually is, because of its incompressability the destructive action of both of the forces mentioned above are considerably magnified. Many attempts have been made to remove this water from the roadbed by means of lateral drains. In most cases such attempts have been failures, and the reason for such failures becomes apparent when we realize that this water is rarely present as free water that will flow. All earthy materials, such as clay, soil, sand, etc., have the ability to combine with a very considerable percentage of their volume of water and to hold it fixed within their pores. Such combined water will not drain out.

Action of Combined Water

The action of such combined water with the various types of earthy materials is vastly different. For instance, if we mix water with clay it becomes a soft and plastic mass with practically no compressive strength. If this water is removed from the clay by the action of heat, the material becomes very hard, with a very high compressive strength. On the other hand, if sand contains a certain amount of water, it may be molded and pressed into blocks with a relatively high compressive strength. If this same block of sand is then dried out, similar to the drying of the clay, the block crumbs and the sand will flow like water and has no compressive strength.

Now, if a mixture is made of the clay and the proper kind and amount of sand, the resultant mixture will take on the best characteristics of each of its components, and will have a fairly uniform compressive strength both in the wet and dry state.

Capillary Action

It is the writer's opinion that any attempt to stabilize roadbeds successfully, must provide adequate means for the removal of any excess combined water. Fortunately, mother nature has provided a phenomenon which, if properly and scientifically employed, will accomplish this result. This phenomenon is that of capillary action. The laws governing capillary action are quite numerous, but the four most important, as far as roadbed stabilization is concerned, are: (1) that capillary action will cause water to flow in a vertical direction as if in defiance of the laws of gravity; (2) that capillary action causes water to flow in any direction, but always from a wet to a drier region; (3) that the flow of water by reason of capillary action is greatest in densely packed materials having very fine pores; and (4) that capillary flow is increased by mechanical actions.

When sand is properly used it will provide the highest degree of roadbed stabilization at the lowest possible overall cost. This sand may be applied in the following described manners to produce a stabilization that will have many years of useful life. However, for best results the sand must have the proper characteristics. It is the writer's opinion that this sand may be added from the top of the roadbed and a more uniform stabilization secured than if the sand is introduced from below.

Vertical Drain Method

The following methods of sand stabilization can be applied to any kind of ballast or roadbed without any other work being done than the sand application. The first of these we call the Vertical Drain Method. It is illustrated by Figure 5. The process of installing these vertical drains is as follows:

Four round steel spuds, 9 in. in diameter, are driven downward through the ballast and into the roadbed to a depth of 5 or 6 ft. below the bottoms of the ties. The spuds are then withdrawn and the holes immediately filled with the proper kind of sand up to the top of the ballast section. As shown by the illustrations, these vertical sand drains are located in the cribs on both sides of each rail. Any desired number of cribs can be treated in this manner, although for ordinary stabilization purposes every fourth crib is sufficient.

Functions of Sand-Filled Holes

These sand-filled holes perform two functions. The first is the compacting of the roadbed material by an amount equal to the volume of the spuds. The second and main function, however, is that these sand columns will cause water to rise vertically to the top of the ballast section where it is evaporated. Because this vertical drainage of water is so important it is absolutely essential that the sand be properly compounded for maximum vertical capillary action. These vertical drains will tend to draw water from a considerable surrounding area, and if properly placed with respect to the troughs in the roadbed, they will be very effective in removing the water from these troughs and thereby materially dry and stabilize the entire roadbed.

At first glance one might assume that if these vertical drains cause the

This view, taken 30 days after the initial application of sand to the track surface (see preceding pages), shows how sand had penetrated downward through the ballast and into the subgrade, a distance of more than 16 in. below bottoms of the ties

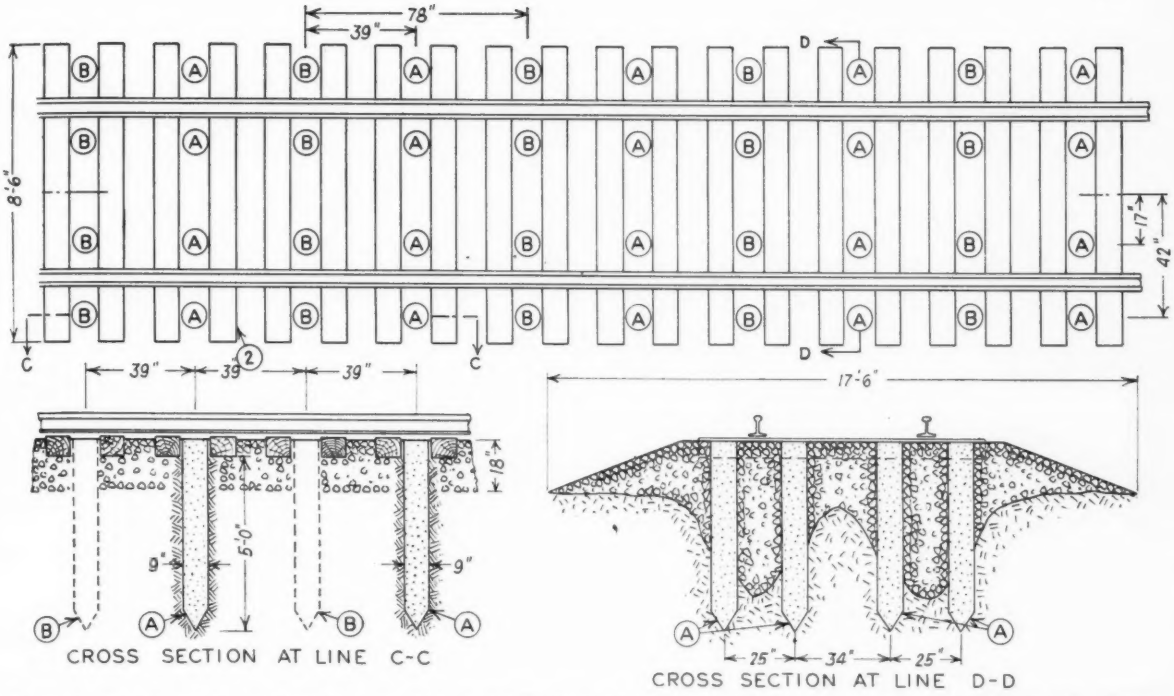


Figure 5—Sketch showing vertical-drain method of stabilization, involving sand-filled holes driven into ballast and subgrade

water to rise from the roadbed in dry weather, they might also provide means whereby the water would flow downward into the roadbed in wet weather. This is not true because, paradoxically, many times as much water will flow upward in sand due to capillary action as will flow downward due to gravity action.

Precautions Suggested

When driving spuds or wooden piles into a roadbed section certain precautions should be observed. A round spud or pile is preferable to a square one because a round spud compacts the roadbed material laterally in a uniform manner. Due to the fact that the distance from the center to the corners of the square section is 43 per cent greater than the distance from the center to the center of the side, the corners of the square spud will move the roadbed material that amount further than the side, and may create undesirable fissures in the roadbed material

The cross section area of the spud is likewise important. A large number of small cross sectional areas is preferred to a fewer number of large cross sectional areas. When driving these spuds to secure maximum compaction of the roadbed material, it is important not to raise the roadbed material vertically to cause heaving of the track, because any such upward movement results in a loosening of the top portions of the roadbed material, and the effect of the compacting is nullified. To prevent this upheaval of the track the spud-driving mechanism should be mounted close to the trucks of a car of sufficient weight to prevent any heaving of the track.

Sand In and Under Ballast

The second method of using sand in roadbed stabilization is illustrated by Figure 6. In applying the sand

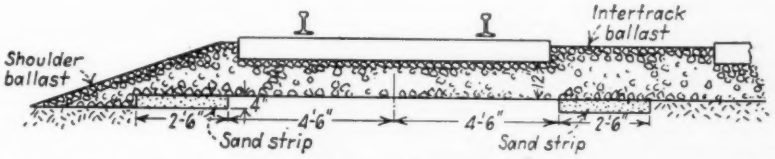


Figure 6—Another suggested method of stabilization, which involves strips of sand applied to the top of the subgrade while the ballast is lifted by a special machine

according to this method, a special device is used for lifting up all the ballast above the roadbed surface, in either the shoulder or inter-track space. While the ballast is in this elevated position, a strip of sand is applied to the top of the roadbed surface, and the ballast is then redeposited on this sand. That this strip of sand will quickly mix with the roadbed material and work inward toward the center of track, and downward, and in its progress combine with earthy materials, has been thoroughly proved. This peculiar penetrating action of sand may be easily demonstrated by filling a box with clay or other heavy earthy material that contains an appreciable amount of water. If the top surface of this clay or other material is covered with sand, and the box placed on a vibrating machine, such as a foundry shaker, the sand will very quickly penetrate into the clay or other material and work toward those portions containing the most water. A very appreciable amount of sand can be worked into the clay in this manner, and the resultant mixture will be several times as stable as the original clay or earth materials.

Use of Machines

Special machinery has been designed for applying all of these methods at a very rapid rate and in an economical manner, and it is the opinion of the writer that railroad roadbeds can be stabilized thereby in a much more uniform manner and at a much lower cost than by any of the methods in use today.

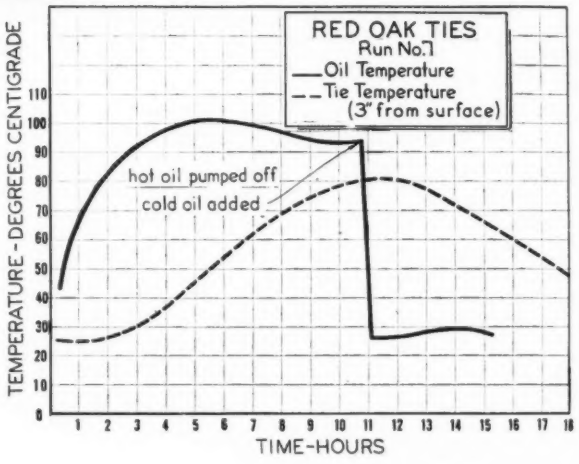
Tests Penta T

Photograph showing the treating tank used for the experimental work. It was equipped with an oil transfer pump for rapidly pumping off the hot oil and immediately adding the cold oil

The Dow Chemical Company recently carried out a series of experiments on the treatment of ties with pentachlorophenol by the hot-and-cold bath method. The favorable results obtained in the experimental work suggest interesting possibilities in the use of this method. Mr. Meyer describes the various experiments conducted and gives details concerning the purpose, procedure and results of each.

By F. J. MEYER

Biochemist, Dow Chemical Company
Midland, Mich.



Time — temperature curves for oil and for ties with the thermocouple imbedded 3 in. from the surface of the tie

• Those concerned with materials and equipment for railway wood preservation will be interested in the data developed recently by the Dow Chemical Company, Midland, Mich., as a result of a series of experiments on the treatment of ties with pentachlorophenol-in-oil solutions, using the hot-and-cold bath process, a non-pressure treatment used successfully for a number of years for fence posts and utility poles. The data indicate that adequate absorption and distribution of the preservative can be obtained simply and economically by this process. The absorption of preservative attained by this method is due to the partial vacuum created when the gases in the wood cells contract in the cold bath after being expanded by immersion in the hot bath.

In these experiments untreated framed and bored ties which had been seasoned for approximately one year were used. Most of the ties were of red oak; others were of white oak, southern yellow pine, black gum, hard maple, beech, sweet gum, rock elm, red elm, ash and hickory. The oil used had an API (American Petroleum Institute) gravity at 60 deg. F. of 30, a flash point of 220 deg. F., and an SUS (Saybolt Universal seconds) viscosity at 100 deg. F. of 37.6. This oil, containing 5 per cent of pentachlorophenol by weight, was used for both the hot and cold baths.

The general procedure followed in the experimental work was to treat two ties per run. The ties were first weighed and then placed in a tank and covered with the preservative oil solution. Next the oil was heated until the wood reached the desired temperature as measured by thermocouples and a potentiometer. While being heated the oil was constantly circulated. After the ties reached the desired temperature the hot oil was pumped off and cold oil immediately pumped into the tank. In most cases the ties were soaked in the cold oil overnight. In the morning they were removed and weighed, and the absorptions in pounds per cubic foot were calculated. In all, five experiments were conducted. A brief account of the purpose, procedure and results of each experiment follows:

Experiment 1—Using red oak ties this experiment was set up to determine how hot a tie must be to obtain adequate absorption. To measure the temperature a thermocouple was imbedded in each tie 3 in. from the tie surface. In the first run the hot oil was pumped out and the cold oil added when the temperature of the tie 3 in. from the surface was 59 deg. C. In the next two runs the temperature was raised to 68 deg. C.,

Table 1—Comparison of Absorptions for Red Oak Ties at Various Temperatures

Run No.	Temp. (deg. C.) of Tie 3 in. From Surface	Hours in Cold Oil	*Absorptions—Lb./Cu. Ft.
1	59	16	5.7, 3.9
2	68	16	6.8, 7.1
3	68	16	4.7, 6.1
4	80	12	6.5, 5.1
5	80	12	5.6, 8.7
11	80	13	7.0, 6.4
12	80	19	8.7, 3.8
14	80	15	8.2, 7.1

* The values given in this table are low because no correction was made for moisture lost during immersion in hot oil.

Treatment for Ties by Hot-and-Cold Bath

and in the last five runs to 80 deg. C. The absorptions of the preservative attained under these various temperatures are summarized in Table 1. The amounts shown are approximately one to three pounds low because no correction for moisture lost during immersion in hot oil was made.

Experiment 2—In this experiment red oak ties were again heated to 80 deg. C. 3 in. from the surface, but were weighed first after only 2 hr. in the cold bath, then put back into the bath and weighed again 88 hr. later. For the two ties in this run the absorptions after 2 hr. were 5.1 lb. per cu. ft. and 5.8 lb. per cu. ft. respectively; after a total of 90 hr. they were 9.3 lb. per cu. ft. and 11.2 lb. per cu. ft. This indicated that absorptions continued to increase until the tie reached atmospheric temperature.

Experiment 3—This experiment was carried out to determine the length of time required to heat the tie to 80 deg. C., first at a location 3 in. from the surface and then at 1 in. from the surface, and also to find out approximately how much time is required in the cold bath before the temperature of the tie drops to that of the atmosphere. Time-temperature curves for oil and wood were plotted from the results obtained in this experiment. These show that whereas a period of 10 to 11 hr. is required to heat a tie to 80 deg. C. at a point 3 in. from the surface, only about 5 hr. is required to heat the tie to the same temperature 1 in. from the surface. It was decided to save this difference in time in other experiments by using the 1 in. depth and, apparently, just as good results were obtained. It was estimated from this experiment that 12 to 16 hr. are required to cool the ties to atmospheric temperature.

Experiment 4—This experiment was conducted to compare the relative ease of treatment of red oak with several other species of wood. All the ties involved in the test were heated to a temperature of 80 deg. C. 1 in. from the surface and left in the cold oil overnight. The absorptions obtained are shown in Table 2. The values given in this table are corrected for moisture lost during immersion in hot oil. The results indicate that southern pine, black gum, hard maple, white elm and red elm are easier to treat than red oak, while white oak and hickory appear to be more difficult.

Table 2—Results of Tests on Several Species of Ties

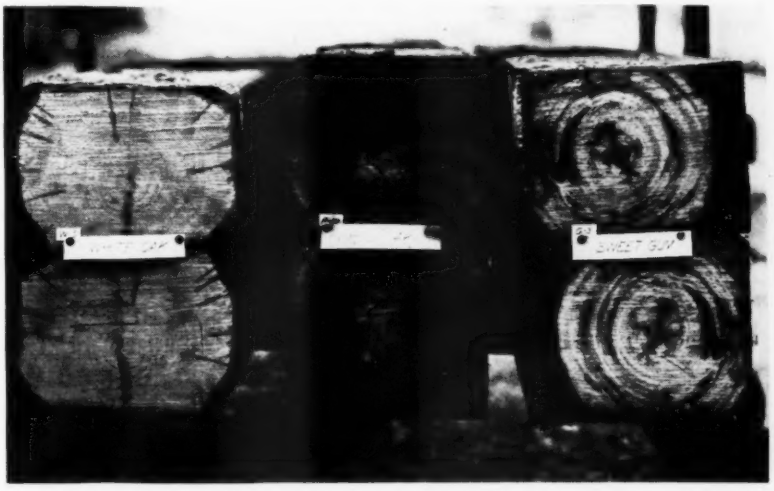
Tie Species	Run No's.	Hours in Cold Oil	*Absorption in Lb./Cu. Ft.
Red Oak	13, 15	17	8.2, 8.1, 5.1, 9.0
White Oak	25	18	4.8, 4.1
Southern Pine	16	19	27.5, 17.2
Black Gum	17	18	16.8, 14.2
Sweet Gum	20	18	8.1, 18.6
Hard Maple	18, 26	18	14.5, 10.0, 14.7, 14.0
Rock Elm	21	18	3.9, 13.0
White Elm	22	18	20.8, 17.8
Red Elm	23	17	18.0
Beech	19	19	8.7, 13.9
Ash	23	17	7.0
Shagbark Hickory	24	19	5.3
Bitternut Hickory	24	19	0.9

* The values given in this table are corrected for moisture lost during immersion in hot oil.

Table 3—Results of Tests for Distribution of Preservative (Red Oak Tie)

	Lb./Cu. Ft. of 5 Per Cent Penta in Oil	
	Boring 6 in. From End	Boring at Middle
First inch of boring	12	13
Second inch of boring	12	10
Third inch of boring	8	6

Experiment 5—This experiment was carried out to determine whether adequate distribution of the preservative was being obtained—a factor equal in importance to absorption. To determine the distribution of preservative several ties were cut at the midpoint following treatment. Good distribution of the preservative was noted in the red oak, gum and yellow pine ties. The preservative failed to penetrate white oak, the only other species checked. Borings 5/32 in. in diameter by 3 in. long, taken from the red oak tie shown in one of the accompanying photographs at two points—one 6 in. from one end and the other at the middle of the tie—were analyzed with the results shown in Table 3.



Showing distribution and penetration of the preservative in three of the tie species tested. In the white oak ties at the left an absorption of only 4.8 lb. per cu. ft. was attained. Absorption for the red oak ties shown in the middle amounted to 8.7 lb. per cu. ft., and for the sweet gum ties at the right it was 8.1 lb. per cu. ft.

100 Ways to Avoid

This article constitutes an easily-read and readily-understood refresher course in the use and misuse of practically every type of ladder and scaffold, and should be "must" reading for every employee in the bridge and building forces of the railways. Strict adherence to the rules set forth would go a long way toward eliminating needless accidents resulting from carelessness or ignorance in the use of these necessary auxiliaries to much bridge and building work.

• In this discussion it is assumed that the ladders to be used are manufactured or built on the job to standard specifications as to material and workmanship, and that where fixed ladders are installed, the recommended landing platforms, guard rails, toe boards and standard clearances have been provided.

In the first place, care must be exercised in selecting and protecting locations where ladders are to be used:

(a) Ladders must not be left unguarded when used in or immediately adjacent to passageways, stairways, walks, roads, etc.

(b) They must not be placed unattended in front of door opening or where they may be hit by the swing of the door.

(c) They must not be placed in front of unguarded openings, pits, trenches or other locations where there is danger of falling to other levels.

(d) Where ladders are used in wells or other openings and have runs exceeding two floors, overhead protection shall be provided at every alternate floor.

When portable ladders are used, they should be placed at a safe angle of approximately one-fourth the length of the ladder.

If ladders have a tendency to spring when weight is applied, bracing must be provided to overcome this. This applies particularly to extension ladders.

Single ladders must not be spliced together to provide long ladders.

Ladders with broken or missing rungs or steps, broken or split side rails, or other faulty or defective construction, must not be used. When ladders with such defects are discovered, they must be withdrawn from service and marked for repair or destruction.

When portable ladders are used on smooth floors or other smooth surfaces and are not lashed or blocked, they shall be equipped with non-slipping bases or shall be held while in use.

The practice of facing the ladder when ascending or descending should be enforced, and descending by sliding must not be permitted.

The carrying of tools while ascending or descending ladders should be prohibited. The use of both hands should be insisted upon.

Before climbing ladders, workmen should see that their shoes are free of grease or other slippery substances.

Ladders should be stored in such a manner as to provide ease of access and inspection and to prevent danger of accidents when withdrawing them for use. Ladders stored in a horizontal position must be supported at a sufficient number of points to prevent sagging.

In order that defects may be readily discovered, ladders must not be painted, but may be preserved with linseed oil, shellac or varnish.

Step Ladders

Portable step ladders over 20 ft. in length must not be used.

Step ladders shall be so constructed that when in the open position all treads will be level. They should be equipped with an automatic locking device or spreader to hold the front and back rails securely in place when the ladder is in the open position. They should never be used as a working platform.

Workmen should never work from the top step of a step ladder; if necessary, a higher step ladder should be used.

Every step ladder more than 10 ft. in height, when in use, should be held by an attendant.

Other Ladders

No extension ladder exceeding 60 ft. in length when extended shall be used.

No extension ladder shall have more than two sliding sections.

Frayed or badly worn rope shall not be used on extension ladders.

Adequate precautions should be used to brace ladders when excessive spring is evident.

Trestle ladders over 20 ft. in length must not be used.

All trestle ladders must be used fully open to the width of their stops or spreader at all times.

Extension trestle ladders over 20 ft. in length shall not be used.

Ladder rungs shall not be used to support more than one section of plank, and not more than two employees shall work on such sections of planking at the same time.

The over-all length of a sectional ladder must not exceed 31 ft.

The bottom and intermediate sections must not exceed a length of 6 ft. 4 in., and the top section shall not exceed a length of 9 ft.

The connection joints shall be not less than one foot long and shall have a close fit without binding or unnecessary play.

To prevent becoming unbalanced while on a ladder, never reach beyond normal arm length.

Do not leave ladders unattended where they may fall or be knocked down, striking other persons.

Helpers carrying material in hands, or otherwise, should not go upon a ladder when another man is already on it.

Scaffolds

Scaffolds used on construction and repair jobs are of so many designs that only a few suggestions with regard to their use can be given here. A volume would be required to treat the subject adequately.

It is assumed that scaffolds of proper design for the protection of workmen and the economical performance of the work have been selected and erected, using only materials and workmanship recommended in a recognized specification. It is a mistake to use faulty or second-hand materials in the construction of a scaffold because the scaffold may be of a temporary nature.

A scaffold should be strong enough to carry the load it will be subjected to, with a factor of safety of not less than 4.

A pole scaffold should be constructed of knot-free, straight-grained lumber, well braced. It should be tied to the structure and fully nailed to full length of nails at all joints and intersections, and provided with safe access. Supports must rest on an unyielding foundation without shims or blocks. Where more than 12 ft. high, they must have safety guard rails properly attached.

Suspended scaffolds are recommended for buildings more than five

Accidents in Using

LADDERS AND SCAFFOLDS*

By W. A. SPELL
Engineer Maintenance of Way
Western Division, Atlantic Coast Line
Atlanta, Ga.

stories high, built with a frame that will provide overhead support. They must be built and attached to the building frame in an approved manner, and be equipped with approved hoisting machines.

Swing scaffolds must not exceed 24 in. in width, should be supported on wrought iron stirrups, and should be equipped with guard rail, intermediate rail and toe board. Not more than two men should be allowed to work on a swinging scaffold at one time.

Outrigger scaffolds, with thrust-outs on 6-ft. centers, and extending not more than 6 ft. from face of wall, must be provided with guard rail and toe board. Outrigger scaffolds may be used to support suspended or swing scaffolds, or as a base for pole or horse scaffolds.

Bracket scaffolds must be substantially built and attached to the frame of a structure with not less than 5/8-in. bolts. The brackets shall be spaced not more than 10 ft. center to center.

Square or jack scaffolds should be not more than 5 ft. square, set not more than 5 ft. center to center on a level and unyielding foundation, and well braced. Where more than one tier is used, the upper tiers must rest on continuous planking, with the upper squares placed directly above those below, and well braced front and back.

Needle-beam scaffolds must be equipped with guard rail, toe boards, and screen protection, and have clear spans of not more than 12 ft.

Horse scaffolds should be built of knot-free, straight-grained lumber, well braced and nailed at all intersections, and placed on a firm, unyielding foundation. Where more than one tier is used, the upper horses must rest on continuous planking and directly above lower horses. Horse scaffolds must not be used more than three tiers high, and tiered scaffolds must be tied or braced.

Ladder trestle scaffolds must have the feet of ladders securely placed and braced so they cannot spread, and must not exceed 14 ft. in height.

Ladder jack scaffolds must be securely clamped to ladder and bear on side rail. Not more than one person should work on such scaffolds.

Window jack scaffolds should be used only for the purpose of working on the window openings through which they are placed, and not more than one person should be permitted on such a scaffold at one time.

Barrel or box scaffolds should never be used.

Scaffolds of all kinds must be well maintained throughout the time of their use and must have continuous inspection to see that needed maintenance is not neglected.

Scaffolds should be cleared of all tools, materials and debris at the end of the working day.

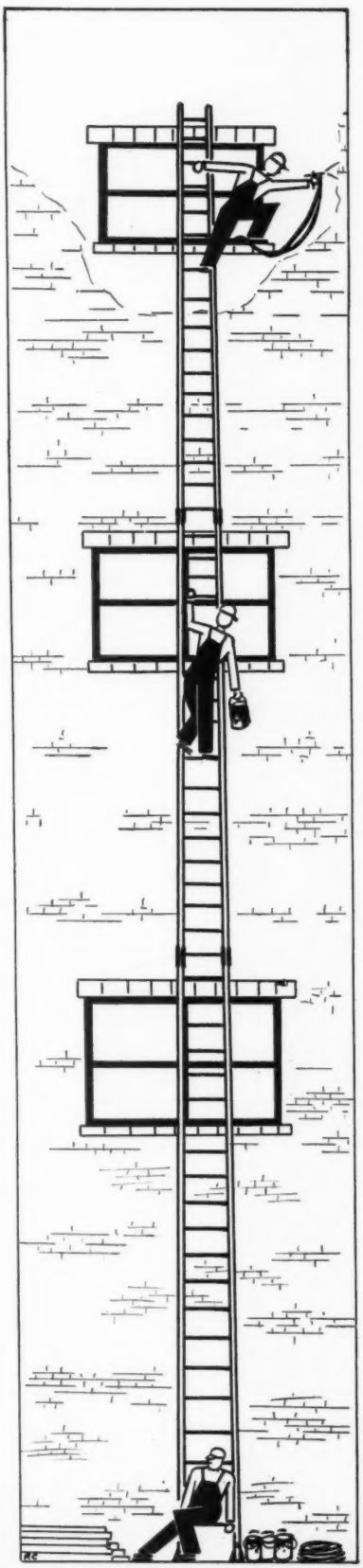
Scaffolds should not be used for storing materials.

Platform planks on scaffolds should be not less than 2 in. thick, laid close together, and extend not more than 18 in. beyond supports.

Where ropes are needed with scaffolding, high-grade manila not less than 3/4 in. should be used, and where subjected to chafing, it should be protected by padding. Rope having come in contact with acid should be discarded. Ropes and cables must be examined before each operation.

On all types of scaffolds, there should be room for workmen to move freely and safely about their work.

Men working on ladders and scaffolds must keep their minds on their work, and not indulge in horse-play or show-off moves. They should be under constant, careful supervision of the foreman, who should satisfy himself each working day that equipment, tools and men are in condition.



"Danger" is written all over the faulty practices illustrated in this sketch

* A paper presented before an annual conference of safety committee chairman and other supervisory officers of the A.C.L.

Charts Speed Determination of Proper Curve Characteristics

Degree of Curvature— Superelevation— Length of Spiral

By THOMAS R. KLINGEL

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University of Minnesota
Minneapolis, Minn.

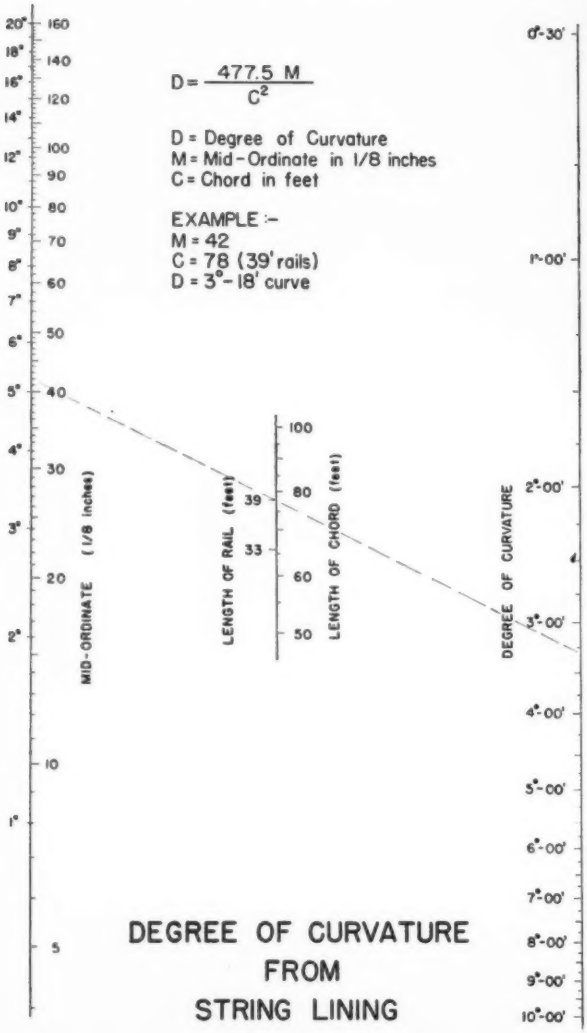
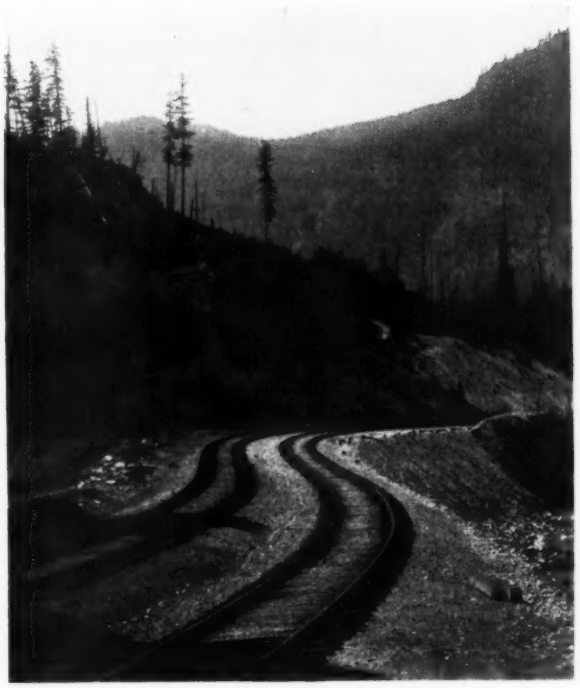

$D = \frac{477.5\ M}{C^2}$
D = Degree of Curvature
M = Mid-Ordinate in 1/8 inches
C = Chord in feet
EXAMPLE :-
M = 42
C = 78 (39' rails)
D = 3°-18' curve
MID-ORDINATE (1/8 inches)
LENGTH OF RAIL (feet)
LENGTH OF CHORD (feet)
DEGREE OF CURVATURE
DEGREE OF CURVATURE FROM STRING LINING

Figure 1



Successful results in string lining depend on correct superelevation and proper length of spiral as well as good alinement

THE degree of success with which any curve is string lined depends directly upon the care taken to see that good alinement is obtained with minimum throw of the track, that the superelevation is correct for the degree of curvature and average and maximum train speeds, and that the spirals are of the proper length for the superelevation and train speeds. If any of these factors is neglected the resultant curve will not ride as it should and will not remain in good alinement.

Determining the proper superelevation and length of spiral requires the solution of a few relatively simple formulas. The solution of these formulas is not difficult, but if the work is being done in the field, it is usually inconvenient and all too frequently omitted. The nomographs for these formulas, when printed to fit the standard engineer's looseleaf field notebook, offer a rapid, convenient and accurate method of securing the necessary information. These nomographs are presented herewith, together with one for determining the degree of curvature.

Degree of Curvature

The first step is to check the degree of curvature. The information necessary is the average mid-ordinate in one-eighth inches, and the length of chord in feet

(twice the length of rail if two rail lengths is taken as the chord length). A straight edge laid on the chart (Figure 1) connecting these two values will give the degree of curvature on the third scale.

Superelevation

Having determined the degree of curvature, the second step is to determine the proper superelevation for the curve. The information necessary is the degree of curvature and the average train speed. A straight line connecting these values on the chart (Figure 2) will give the superelevation on the third scale. The maximum comfortable train speed will result in an unbalanced elevation of 3 in. By increasing the superelevation just obtained by 3 in. and connecting this value and the degree of curvature with a straight line, the maximum train speed is obtained on the center scale.

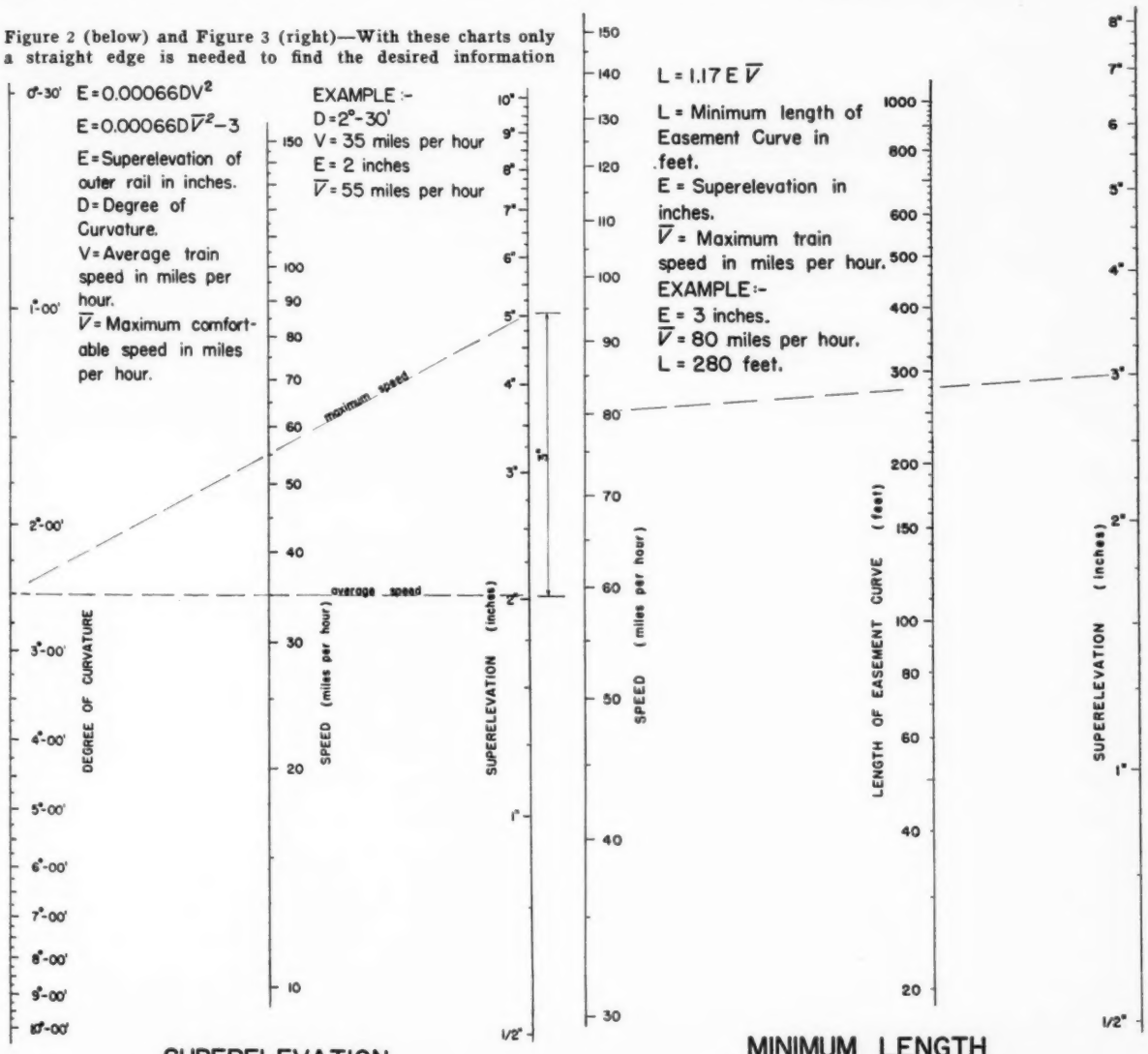
If the maximum speed is known for any curve, a line connecting the degree of curvature and this speed will give an elevation which, when decreased by 3 inches, is the minimum allowable superelevation. It is possible by the use of this chart to establish the superelevation based on either the average train speed or the maximum train speed, or to determine the maximum train speed permissible on any curve for any given superelevation.

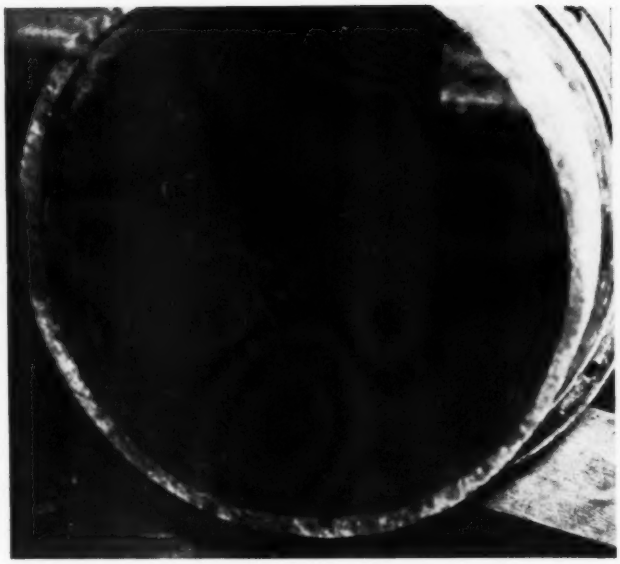
Length of Spiral

Once the superelevation has been established, the third step is to determine the length of easement curve. The information necessary is the superelevation and the maximum train speed. Connecting these two values on the chart (Figure 3) with a straight line will give the minimum length of easement curve on the center scale.

Once an engineer becomes familiar with these charts he can read off the values rapidly and with confidence. The charts, to be of value, must be of such size that they may be used conveniently in the field. The surveyor's looseleaf field notebook, used by most engineers, is large enough to give charts which may be read with sufficient accuracy, yet small enough to be carried in the field without difficulty. Charts of this size may also be trimmed and inserted in the common field handbooks on curves and earthwork.

Figure 2 (below) and Figure 3 (right)—With these charts only a straight edge is needed to find the desired information


E = 0.00066DV²
E = 0.00066DV̄²−3
E = Superelevation of outer rail in inches.
D = Degree of Curvature.
V = Average train speed in miles per hour.
V̄ = Maximum comfortable speed in miles per hour.
EXAMPLE :-
D = 2°-30'
V = 35 miles per hour
E = 2 inches
V̄ = 55 miles per hour
maximum speed
average speed
DEGREE OF CURVATURE
SPEED (miles per hour)
SUPERELEVATION (inches)
SUPERELEVATION FOR CURVES
L = 1.17 E V̄
L = Minimum length of Easement Curve in feet.
E = Superelevation in inches.
V̄ = Maximum train speed in miles per hour.
EXAMPLE :-
E = 3 inches.
V̄ = 80 miles per hour.
L = 280 feet.
SPEED (miles per hour)
LENGTH OF EASEMENT CURVE (feet)
SUPERELEVATION (inches)
MINIMUM LENGTH OF EASEMENT CURVE



Asphalt Lining "Rejuvenates"

This article describes the manner in which a 24-in. cast-iron pipe line in Charlotte,, N. C., was cleaned by the Pittsburgh Pipe Cleaner Company, and given a bituminous lining by the Pittsburgh-Eric electrolytic process under the supervision of the author. On the basis of the immediate results of this work, he states that "The feasibility of lining 24-in. pipes in place has been satisfactorily proved."

By GEORGE S. RAWLINS
Vice President, J. N. Pease & Co.
Charlotte, N. C.

• The answer to the question, "Can cast-iron pipe line be treated in place to prevent corrosion or tuberculation?" is not simple and cannot be made without reservation and a definition of just how comprehensively we use the word "prevent". I have recently been in charge of the reconditioning of a 24-in. cast-iron line approximately 17,100 ft. long, which carries raw water by gravity from a reservoir to the filter plant of the City of Charlotte, N. C. The methods used and the results obtained may be of interest to railroad men having similar conditions.

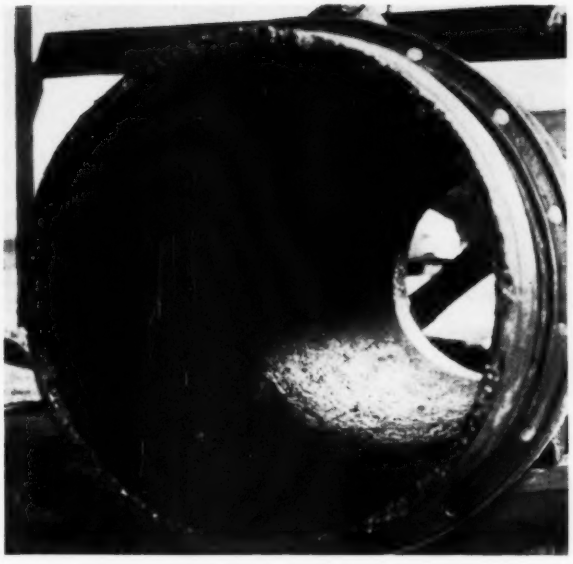
Age of Pipe Line

This water main was laid in 1912. During 1924 a 600-ft. section of the line was replaced with other pipe in a different location at the filter plant end. None of the original pipe was re-used in the line. Five years later a 30-in. cast-iron main was laid parallel, for most of its length, with the 24-in. main.

Although the water carried in these lines is moderately aggressive, neither main had been cleaned or reconditioned in any manner up to 1947. To determine whether cleaning was necessary, loss-of-head tests were run by engineers. Hydraulic-gradient elevations were determined for each main operating at full capacity by observing water columns at each end. The flow in each pipe was measured with a venturi meter at the filter plant and found to be maximum of 3,920 g.p.m. from the 24-in. main. These tests indicated that the overall values of the coefficient "C" in the Williams-Hazen formula was 69 for the 24-in. main and 102 for the 30-in. main. (Editor's note—accepted values of "C" in this formula, for cast-iron pipe 3 in. to 60 in. in diameter running full are: (1) 140 for best new pipe, carefully laid; (2) 130 to 120 for good, new pipe; (3) 100 for pipe in fair condition; and (4) 80 to 40 for tuberculated pipe.)

Since the coefficient for the 24-in. pipe showed that this pipe was in need of reconditioning, an investigation was made of the Pittsburgh-Eric mechanical-electrolytic pipe-cleaning and lining process*, and also the cement-lining process of reconditioning water mains in place. From this investigation it was determined that either process would be satisfactory and a specification was written whereby bids could be received on each. To protect the city, certain requirements were included in the specifications whereby the contractor was required to guarantee the performance of the reconditioning process over a period of five

*Briefly, this process involves first cleaning a pipe thoroughly with the aid of cutters, scrapers, brushes and rubber pistons, then electroplating the inside with bitumen. A cylindrical copper cathode, about a foot long, is centered in the cleaned pipe by guides. Attached to the cathode is a small wire rope which is used to pull it through the pipe. The cathode is insulated from the pipe wall but is connected to the negative pole of a portable electric generator, the positive pole of which is connected to the pipe wall. When a section of pipe is filled with a mixture of bitumen and water and a current, supplied to the pipe wall from the generator, flows through the bitumen to the cathode, bitumen particles are said to become negatively charged and to be attracted to the positively-charged wall of the pipe. The particles adhere to the pipe and, in about a minute, a thin layer of asphalt forms on the pipe. A more detailed description of this process appeared in the October, 1947, issue of *Railway Engineering and Maintenance*.



Far left — Tuberculation had cut in half the capacity of this old pipe

Middle left—Conventional methods of cleaning prepared pipe for lining

Left—Coated pipe is as good as new and is expected to remain that way

Old Water Main

years. Futhermore, the contractor was required to furnish a bond guaranteeing that the resulting coefficient "C" in the Williams-Hazen formula would be not less than 125 for the Pittsburgh-Eric process and 130 for the cement-lining process. It should be noted that equivalent pipe-length allowances were set up for fittings and valves encountered in the line. The low bid of the Pittsburgh Pipe Cleaner Company, based on using the Pittsburgh-Eric process, was accepted for the 24-in. main.

Pipe Cleaned in Three Sections

Because the entire length of the main could only be kept out of service for short periods, the line was cleaned in three sections, beginning at the upper end of the lower section —near the filter plant. The cleaning was accomplished with conventional pipe-cleaning equipment, with special attention being paid to the removal of all encrustation and old coating so that the metal was exposed. The hydrostatic head from the reservoir was sufficient to propel the cleaners, except at the upper end of the line. Here they were pulled mechanically or the head was raised by pumping.

Pieces of pipe that were removed for examination before cleaning showed a heavy encrustation, with tubercles as much as 1¼ in. high. Examination after cleaning indicated that substantially all foreign matter had been removed from the metal. The pipe wall was found to be slightly pitted, but on the whole the surface was surprisingly good. A check-flow test, run after cleaning, showed that the value of "C" had been increased to 133—without allowance for valves and fittings.

After the cleaning had been finished, the lining process was carried out in accordance with the accepted procedure of the Pittsburgh Pipe Cleaner Company, modified slightly to suit the terrain and the conditions of operation which required that the pipe lines supply water to the city continuously, except for short intervals. Meeting this latter requirement was simplified by the fact that the two lines are cross connected at several points to provide six sections. By the use of these cross connections the 30-in. line was kept in service almost continuously and only two sections of the 24-in. main were permitted to be kept out of service during the coating process.

Coating Caused No Odors

Immediately after completion of the coating in any section it was flushed out and returned to service. During the coating operation no difficulty was experienced at the filter plant with tastes or odors. However, if this water had been used directly for boilers, it probably would have been wise to have flushed the line more thoroughly to insure the complete elimination of all bituminous residue.

The lining which resulted from this process was approximately 3-32 in. thick, and was generally of uniform thickness, although some droplets appeared occasionally. Consequently, the lining followed the irregularities in the pipe wall, joints, etc. Where the cleaned pipe wall was pitted, the surface of the lining showed the same depressions. The material was plastic under the temperatures encountered but did not appear to flow to the extent of "sagging". The surface was smooth. The material adhered tenaciously to the metal and to all appearances this was uniformly true except where some foreign matter was on the pipe wall. The percentage of defects in the surface was so small as to be of no significance.

After completion of the lining, loss-of-head and flow tests were made by independent testing engineers. They found that the average value of "C" in the Williams-Hazen formula was 130 for three rates of flow. This coefficient was well above the guaranteed value of 125. The feasibility of lining 24-in. lines in place has been satisfactorily proved, in the writer's opinion, by the Charlotte operation. While only cast-iron pipe was involved, steel pipe and pipe of smaller sizes should present no greater difficulties.

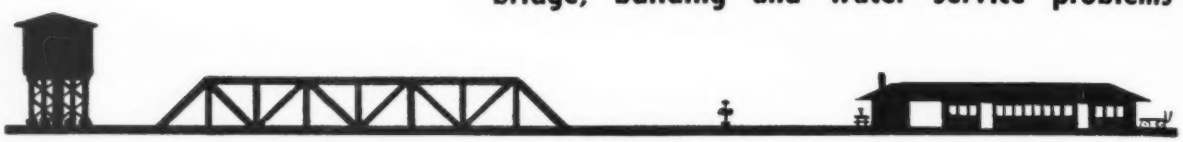
Effectiveness of Method

Just how effective, in the long run, the lining of water pipes by the Pittsburgh-Eric process will be, will depend upon local water conditions and experience to be gained in this country. To date we have had to be guided by long-range results obtained in England where satisfactory experience has been claimed. We hope to follow up the Charlotte work with annual tests to determine the deterioration of the carrying capacity of the line and thereby help to evaluate this method of pipe-line reconditioning.

The advantages of rapid reconditioning of pipe lines in place are fairly obvious in that: (a) The cost of reconditioning is only a fraction of the cost of replacement; (b) interruption to service can be minimized by proper selection of the method of reconditioning to be used; and (c) delays involved in the construction of new lines under present conditions are avoided.

WHAT'S THE ANSWER?

An open forum for maintenance men on track, bridge, building and water service problems



Lining and Surfacing Curves

Should curves be lined before or after being given a general surfacing? Why? What factors are involved? Explain.

Unnecessary to Line First

By JOHN C. ROUSE
Extra Gang Foreman, Southern Pacific, Merced, Cal.

The average curve need not be lined before surfacing as the added expense would not be justified when compared to lining after the curve has been raised and the ballast is loose. However, on curves that are badly in need of lining, such as curves on which spirals are installed or relocated, or where compounds are altered or removed altogether, the distance the track would have to be shifted might move the ties too far off their solid beds if all lining were deferred until after surfacing. One can readily see that, where the track is to be shifted a great amount, it should be done before surfacing. Also, if necessary, readjust the expansion by installing shorter or longer rails as the case may be.

When a rail renewal program is planned for a curve that must be lined with large throws, I have found it good practice to do the lining before the rail job. Then, when the curve is surfaced, there will be little chance of a "sun kink" or of open joints caused by improper expansion.

Line Track Raised Each Day

By R. L. GREENE
Track Supervisor, Nashville, Chattanooga & St. Louis, Chattanooga, Tenn.

The existing conditions will govern the proper time to do the lining. The proportion of the ties to be replaced, the amount of raise permitted, and the existing condition of the alinement, as well as the degree of curve and amount of superelevation, are factors to consider.

If there are few ties to be renewed, and the line and superelevation change but little, the lining should be done after the general raise but before the final surfacing. If tie renewals are heavy, the existing alinement bad, and only a slight raise permitted, then a first lining should be carried out as the ties are replaced or immediately thereafter. A large part of such lining may be done by setting the jacks to throw the track in the right direction, and by jacking first on the rail toward which the track is to be lined. The leaning jacks under the other rail can then throw the track easily as that rail is raised.

It is good practice to line the amount of track worked during the day before quitting at night, if the track is under traffic. Track that is in nearly perfect line will be less likely to move about during the night. If the track is out of service, the work may be done as most convenient.

In general, before final lining, the track should be raised almost to final grade and the proper superelevation given to the outer rail. The final raise then will be only a slight vertical lift, and only a touch of lining, here and there between stakes, may be needed.

If final lining is done after the track is surfaced to grade, particularly on sharp curves with considerable superelevation, the track will be humped up where it is lined out and dipped where it is lined in, and the general surface will be destroyed.

If any settlement occurs under traffic in one rail only, great care is necessary to get the rail back in true line again as it is raised to its original surface. Generally the track will

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Answers to the following questions are solicited from readers. They should be addressed to the What's the Answer editor, *Railway Engineering and Maintenance*, 105 W. Adams St., Chicago 3, and reach him at least 30 days in advance of the issue in which they are to appear. An honorarium will be given for each published answer on the basis of its substance and length. Answers will appear with or without the name and title of the author, as may be requested. The editor will also welcome any questions which you may wish to have discussed.

To Be Answered In the July Issue

1. Do you designate, for the benefit of foremen, where and how much to elevate the track on the runoffs of curves? If so, what method do you use? Do you establish permanent markers? Explain.

2. What are the essentials of adequate employee rest rooms at shops and terminals, especially as regards lockers, wash and sanitary facilities? Explain.

3. Is the use of "butterflies," while riding the rear ends of trains, the best way for a roadmaster or supervisor to notify track foremen of rough spots or other conditions needing attention? What other methods can be used? Explain.

4. To what extent do unequal volume changes in the constituents of concrete contribute to its deterioration? From the standpoint of expansion, what kinds of aggregates should be avoided? Can this be determined readily? Explain.

5. Should a full or limited ballast section be maintained in the intertrack space? Do the kind of ballast or other local conditions make any difference? Explain.

6. What is the sludge-blanket type of water treatment? Under what conditions is it best adapted? What are its advantages? Explain.

7. To what extent do proper design and maintenance of crawl spaces under buildings without basements minimize dry rot in wood floors and other parts of the structure? What other preventive measures are effective? Explain.

tend to move toward the rail which settled.

Frequent checks should be made for some time after the track is overhauled to see that it remains on the staked center line, so the stakes should not be disturbed until they are no longer needed. If the tops of the stakes are below the tops of the ties, they should be left in place permanently.

Generally Don't Line First

By T. F. Egan
Former Extra-Gang Foreman, New York Central, Hillburn, New York

Generally, curves should not be lined before being given a general surfacing, unless it is decided to change the alinement to a great extent. On the other hand, if one waited until after a general surface to line the track to stakes, the track would not be solid on the roadbed following lining, and surfacing would again be necessary to tighten the loose ties that would result from throwing the track from the solid roadbed.

Track is not lined prior to a general surface on curves which aren't to be changed any great amount because the labor involved would be lost. Another reason for not lining track before a general surfacing is that it is loosened up by being moved from its solid position on the roadbed and this undesirable condition will exist until surfacing of the curve has been completed and the ties have been thoroughly tamped. This looseness might increase the tendency for the track to buckle when being raised in hot weather. At the close of each day's work of surfacing, the track should be lined to conform with the remaining part of the curve. Thus, when the surfacing is completed, the lining is finished immediately afterward. However, if a curve is to be elevated to a greater extent due to changed conditions—such as increased speed—it is advisable to line the spiral previous to changing the elevation.

Line, Surface and Smooth Up

By C. E. Barry
Roadmaster, Canadian National, New Glasgow, N.S.

When a curve requires a general surfacing, the amount of lining needed will be governed, more or less, by the length of time, and to what extent it has been out of surface. A curve that is out of surface will not stay in proper line, and the extent it is out of line would be the governing factor as to when it should be lined.

Since it is practically impossible to have track in proper line if the surface is irregular, as spots that are low will soon get out of line, it should be put as near to its proper line as possible before general surfacing takes place, especially if it is badly out of line.

However, regardless of how nearly perfect this may be done, the track will require further touching up after surfacing is completed because spots that are lifted will then take on a different appearance as to line, and may be moved more or less by the action of the jacks when lifting.

If all lining is left until surfacing is completed, the surface may, and in all probability will, be disturbed because of the lifting action of any tool that may be used in lining, as well as for the reason that track raises as it is being pushed through the ballast. Also, if curves are badly out of line, and track is moved several inches after being lifted, the ties will be moved off their beds that have been tamped, resulting in an uneven bearing. If good results are to be obtained, the heavy lining should be done before the surfacing, and the small imperfections in the line taken care of afterward.

Make Major Changes First

By O. H. Carpenter
General Roadmaster, Union Pacific, Pocatello, Idaho

It is assumed that the question refers to curves that are considerably out of line and where a throw of several inches may be necessary to place them in correct alinement. In such cases it is best to line the track to the approximate alinement desired before it is surfaced, and then, after the track has been surfaced, to reline it to the exact alinement desired. The final lining will require throws of only an inch or so and will not disturb the tamping and cause uneven surface of the track, such as may result if the track is thrown several inches after being surfaced. It will probably be necessary to go over the curve again after a few days' traffic and line out any unevenness which may develop under traffic.

Where the spirals are being changed or other work is being done requiring very heavy throws of the track, and when surfacing operations require skeletonizing of the track, the heavy part of the lining should be done while the track is skeletonized, so as to make the work easier and to help prevent tie skewing.

Where the track is so close to the desired alinement that it will not require a throw of more than an inch or two to correct it, the surfacing should be done first and the track lined afterwards, because it would no doubt be thrown out of line to some extent during surfacing operations and no purpose would be served in lining the track prior to being surfaced. In this case also, the track should be gone over and the line and surface corrected where necessary to take care of any unevenness in line or surface which may show up after a few days of traffic.

Line Before and After

By George S. Crites
Division Engineer (Retired) Baltimore & Ohio, Baltimore, Md.

Curves should be lined both before and after being given a general surfacing. In regions where winter affects track, all main tracks should be put in the best alinement possible as soon as the track can be moved in the spring. To prevent the track that is lined from becoming kinked right away, it is necessary to spot surface bad places. With one such going over the track will usually hold until a general surfacing is to be undertaken. In any event, the track should be in reasonable alinement before a general surfacing is undertaken.

This is of importance on all spirals, and is critically important on short spirals because spirals are, essentially, warped surfaces, and the shorter, or the sharper the spiral, the worse the warp will be. Under high speeds, spirals must be kept in true alinement and to the right elevations at all times.

Before the advent of modern track-lining tools, it was almost necessary to jack up the track before it could be lined. But with good tools now available, and by proper planning, an entire district can be put to reasonably good line in a short time. Where tracks have been frozen, it is important to get the lining done at the earliest time possible.

It may be said that track in bad surface can not be lined perfectly, but the fact is that no track should be allowed to become so badly out of surface that it cannot be lined satisfactorily, if not exactly. So the point seems to be—line the track both before and after giving it a general surfacing—letting a few trains run over the surfaced track before giving it the final lining.

Abandonment of Water Facilities

To what extent should water facilities for steam locomotives be abandoned with increased Dieselization? What disposition should be made of such abandoned facilities? Explain.

Some Abandonments Possible

By Douglas Campbell
Assistant to Vice President, Operations and Maintenance, New York Central, New York

The optimum savings through the introduction of Diesel locomotives can be obtained only where districts or divisions are completely Dieselized, because duplicate facilities serving both steam and Diesel power are no longer needed and facilities devoted only to steam power can be retired. The Diesel engine, of course, requires water for cooling purposes and, on passenger units, for the train-heating boilers, but the volume needed is vastly less than that required for steam operation. Because of this reduced volume, many standpipes between terminals can be abandoned altogether and savings obtained from the retirement of pumping stations or the withdrawal of meter guarantees. At terminals or major intermediate points where the watering of Diesels may be required, facilities much smaller than present steam requirements can be installed, or possibly adapted from present steam facilities.

So far as the disposition of abandoned facilities is concerned, scrapping is no doubt the answer, except on such railroads as continue to operate steam divisions. In such cases water facilities removed from a completely Dieselized district can be held in stock to cover requirements on districts where this type of equipment is still in demand.

Completely Dieselize First

By S. G. Phillips
Chief Engineer, Boston & Maine, Boston, Mass.

To reap the full benefit from Dieselization it must reach 100 per cent. If steam operation is mixed up with it there usually results a parallel set of facilities, including water service.

We now have Diesel operation on practically all through runs, both freight and passenger. However, except on our heavy freight line, we use some steam equipment on local freights, also on local passenger and commutation trains. The elimination of water stations has followed this pattern pretty well—that is, water stations formerly used by through runs have been retired, and those required by local trains have been continued, although considerably reduced in size at some points.

Where steam facilities are abandoned, they should be retired from the property to save maintenance and operating costs. This requires, in some instances, a bit of courage and vision on the part of the operating department people, some of whom may hesitate to reduce facilities because they might be needed some time. A joint committee composed of interested department officials who know the problems and the programs has been a useful means to this end. In the past 23 years we have been able to retire 23 locomotive water stations, the elimination of which was made possible by increased Diesel or rail motor car operation.

Sell Facilities for Salvage

By L. F. Racine
Chief Engineer, Chicago, Indianapolis & Louisville, Lafayette, Ind.

Water facilities originally provided for steam locomotives, consisting of pipe lines, meters, tanks and standpipes, can be removed and disposed of promptly whenever a division or a subdivision is entirely Dieselized. On railroads where both Diesel and steam power are in use, of couse, abandonment can not be made. The confining of steam engines to certain divisions or subdivisions, permits prompt retirement of water facilities, on the other Dieselized territories thus effecting a reduction in maintenance costs.

At intermediate points, water hydrants are provided for emergency use and are usually supplied from city water mains. At division points, where regular stops are made, hydrants conveniently placed and connected to city water mains permit the watering of Diesels, thus eliminating the maintenance of expensive water facilities for the small water demand.

Disposition of all retired water facilities, including water tanks, pipe lines, standpipes, etc., can usually be arranged through some salvage firm which will pay a fair price. This avoids the labor cost of removing the facilities, which, in most cases, exceeds their salvage value.

Won't Abandon Hastily

By Master Carpenter

Our division has been completely Dieselized for switchers and local freights only for a short time. The demand for water for such Diesels is very small, but so far we have abandoned only three minor water plugs at which water was supplied from outside sources.

Our original program was to abandon all except two water stations, both of which had to be retained for other users, and to substitute facilities for Diesel passenger service primarily at major station stops. However, this plan will not be put into complete operation until Diesels have been in use long enough to indicate their actual water needs.

Due to other situations beyond our immediate control, we may have to hold up indefinitely the completion of our program. This may complicate our water situation by putting 14 tanks out of service, but which cannot be abandoned. These will have to be kept filled in summer and a half dozen electric water stations will have to be retained for this purpose. In winter the tanks will have to be drained to eliminate ice. While this will be a nuisance, we feel that it is prudent to be cautious in completely abandoning facilities which might possibly be needed later.

Some New Facilities Needed

By M. A. Hanson
Engineer of Research, Gulf, Mobile & Ohio, Bloomington, Ill.

A considerable portion of the economies to be effected by Dieselization are obtained by the abandonment of steam locomotive facilities. Therefore, to secure maximum economies, water facilities no longer needed should be abandoned as soon as the retirement of the steam locomotives from service will permit.

Conditioned water will continue to be required for cooling systems and for the steam generators on the Diesel locomotives. The amount of water required will be much less

than that used by steam locomotives, but the water conditioning requirements may be more exacting. Therefore, in some instances new water facilities may be required when the existing facilities are being retired.

In general, no facilities are needed for cooling water except at terminals. Steam-generator water supplies can also be spaced much farther apart than previous steam locomotive supplies. Most Diesel locomotives have water-supply tanks of such size that the steam generators can be operated at capacity for three hours with one fiilling of the supply tanks. Thus Diesel locomotives can operate completely across most divisions without taking on additional water. It is apparent, therefore, that not more than one-fourth as many watering stations will be required as were needed for steam locomotive operation, and those required can be of relatively small capacity.

In some instances the existing terminal water-conditioning facilities are such that they are suitable for conditioning, or partially conditioning, the required water for Diesel locomotives. It will probbably be desirable to retain such facilities.

Much of the abandoned equipment will have little value except as scrap. This is true of penstocks, gas-engine pumping equipment and most valves and fittings. It may be economical in some instances to recover underground cast-iron pipe for scrap. The wood in wooden water tanks can frequently be reclaimed economically by planing. Steel water tanks, in some cases, can be converted into fuel storage tanks by thoroughly cleaning them and equipping them with the proper safety devices.

Some of the electric-driven centrifugal pumping equipment may be used in connection with car washers, truck washers and, in a limited number of instances, for fire protection. The efficiency curves of centrifugal pumps are such that a rather careful engineering survey is required of such pumps before they are used for purposes other than those for which they were originally purchased. If this is not done the service performance will probably be unsatisfactory or the operating cost may be so great as to nullify the intial saving in using the salvaged equipment.

Even if in many instances the recovery value of retired water facilities is low, we should be careful not to keep in service unneeded facilities with their high overhead costs. During the transition period from steam to Diesel equipment, careful investigation will usually indicate the feasibility of retiring some facilities.

Satisfactory Farm Crossings

What constitutes a satisfactory farm crossing from the standpoint of the user and that of the railroad with respect to economical track and crossing maintenance?

Build to Suit Conditions

By H. S. Chandler
General Supervisor of Track, Chesapeake & Ohio, Richmond, Va.

I believe the most satisfactory crossing for both the farmer and the railroad is one made of Amiesite, especially where farm machinery is used. However, this will not be satisfactory to all farmers who use teams instead of machinery, especially if approach grades are steep. In such cases, horses or mules, exerting themselves most where the pull is heaviest about the time the team reaches the near rail, are apt to slip on the Amiesite, causing them to fall, and injure themselves. In these cases, timber crossings would be more satisfactory to the farmer.

No kind of material is satisfactory at every crossing on a division or sub-division. We should try to use materials satisfactory to the farmers' individual conditions. Where farming is done in a big way, with machinery, the approaches and the crossing itself should be built wide enough to accommodate any machinery that might be hauled over it. Where farming is done in a small way, with teams, it would not require the approaches and crossings to be so wide.

Better Crossings Needed

By William Lindsey
Yard Foreman, Chicago & Illinois Midland, Pekin, Ill.

Many farmers have asked, "Why can't we have a private crossing as good as those on the highway?", that is, a crossing solid with boards throughout instead of the usual board on each side of the rail, filled in with cinders or dirt. The usual answer is that such construction would be too expensive for farm crossing.

But would it? In the past, that was probably true. Under present circumstances there is room for doubt. In these days of heavy farm machinery the farmer needs a more substantial crossing over which he can cross quickly and safely with his heaviest, widest machine. Farm machinery is often too wide for the old traditional crossing of four boards and some dirt, and to accommodate it adequate crossings must be built.

Dirt or cinders, used to make up for the lack of boards, foul the ballast and increase track maintenance costs. Hence it would seem to me that full-boarded farm crossings will help to lower such costs as well as provide adequate facilities for the heaviest, widest farm machinery.

Black-Top Crossing Best

By E. L. Anderson
Assistant Chief Engineer, Maintenance, St. Louis-San Francisco, Springfield, Mo.

The requirements of a satisfactory farm crossing from the standpoint of a user can be divided into four items: (1) Width of crossing; (2) grade of approaches; (3) visibility of approaching trains; (4) location of the crossing with respect to farm drives.

The width of a crossing, or length, measured along the track, should not be less than 12 ft. Greater width may be required in particular cases where the crossing is to be used for large combines, long-length hay rakes, etc. These factors should be determined by a conference with the user.

The grade of the approaches should be as nearly level as practicable, particularly where gates are maintained or where it is necessary to stop and start on the approaches. If a level, or practically level, grade for the full length of the approaches cannot be secured, a sufficient length of level grade should be maintained in each direction from the center of the track so that cars, trucks or farm vehicles can be readily moved over the crossing without dragging any portion of the equipment. Good visibility of trains from the crossing approaches

is very important to prevent collisions with trains.

The location of a crossing with respect to farm drives is important because, ordinarily, the farmer will have a drive from his place of residence or barn on one side of the track to a field located on the other side.

To insure economical track and crossing maintenance the following points should be considered from the standpoint of the railroad: (1) Type of construction of crossing and approaches; (2) location; (3) State laws.

The type of crossing construction that is most satisfactory to both user and the railroad consists of a plank, not less than eight inches wide, placed inside each rail and spaced from the rail so as to give an adequate flangeway. The space between the planks is filled in with ballast or other hard material and has a top wearing surface of a ballast-and-asphalt mixture, or a mixture of discarded oil and ballast. The surface of the approaches are dressed off with cinders or dirty, discarded ballast to facilitate easy movement of farm equipment, especially that of the mechanized type, and to prevent dirt from being deposited on rails and in flangeways during wet weather.

The location of a crossing, from the standpoint of the railroad, is very important. It is preferable to locate it, where possible, on a light fill to secure drainage, give good view for adequate "sight distances" to the user, and have light grades on its approaches. A crossing should never be located in a cut if it is possible to locate is elsewhere, because in such a location it will obstruct drainage in ditches and will permit water to run down the approaches onto the track. Neither should a crossing be located immediately at the end of a cut, nor where there is any tendency for the track to be subject to water pockets or soft places. The location should be selected, if possible, where telegraph and telephone wires will clear the surface of the approaches at least 14 ft., and, if possible, where a rail joint will not come in the crossing. Ordinarily the latter can be achieved, particularly at locations where only a 12-foot crossing is required.

Many states have laws governing crossings for farm use and it is important that these laws be complied with. However, as most of the pertinent laws originated when practically all farm vehicles were horse drawn, they do not require crossings to have qualities so high as those which the railroads find economical to construct to accommodate the mechanized farm equipment now in use.

Supplying Electricity to Camp Cars

What is the best way to supply electric power to camp cars? What voltage should be used? What are the essential features of the wiring involved? What outlets should be provided? What precautions should be taken?

Power Generator Units Used

By J. G. Rayburn
Superintendent Car Shops, Chesapeake & Ohio, Russell, Ky.

The Chesapeake and Ohio Railway Company has been supplying electric current for lighting, etc., on camp cars for a number of years by using a portable two-conductor cable of suitable size and length, connected through suitable plugs and receptacles to 110-volt, a.c. lines, when such lines are located near the sidings on which the camp cars are parked.

This source of supply has not proved entirely satisfactory, however, due to the fact that there are no electric lines near many of the sidings where the camp cars must be parked. To overcome this inconvenience, we have, for the past few years, been furnishing electricity on some of our camp car outfits from gasoline engine-driven generators. These generators are installed in a car known as a "power car," which has been converted from a box-type freight car. The power unit is placed in one end of the car and a solid partition separates it from all other tools and equipment which may be placed in the opposite end.

Suitable carbon-dioxide fire extinguishers are provided in the power unit room and suitable ventilation is provided for the disposal of heat and fumes created by the engine. These features should be approved by the authority having jurisdiction over fire-prevention matters.

The power unit consists of a gasoline-engine-driven 110-220-volt d.c. generator, equipped with starting batteries and control equipment which start the engine automatically when a lighting switch is turned on or an electrical appliance is attached to the circuit.

The cars are wired for 110-220-volt circuits and necessary lighting and power outlets are provided for lights, radios, fans, etc. Receptacles are provided at each end of the cars for making train-line connections. It is necessary that restrictions and careful supervision be exercised to avoid overloaded circuits and creating other conditions which may cause fire hazards.

The power car is placed at one end of the camp-car unit to avoid disturbing the occupants of the living cars. The power-unit wiring and control equipment are provided with suitable protective equipment—circuit breakers being preferable to fuses.

The number of cars used in each camp-car outfit governs the capacity of the power unit to be installed. On our railroad we have used units of three, five and ten kw. capacity, depending on the number of cars and the estimated load per car.

The power unit method for supplying electric power to camp cars, no doubt, will be improved. However, we have obtained very satisfactory results and have had no serious complaints from the camp-car personnel.

Should Have Light Plants

By F. L. Wilson
Roadmaster, Missouri-Kansas-Texas Lines, DeLeon, Tex.

I think each camp-car outfit should have its own power unit to which all lights, radios, fans and other equipment should conform. The system, often in use, of having extension cords to hook up to outside lighting circuits, where they are available, requires a lot of time to connect and disconnect. However, that is small in comparison to the inconvenience and waste of time occasioned by the camp cars being set out at a location where electricity is available—but four or five miles from the point of work. No bridge gang, welding gang or extra gang can be expected to remain without

electricity for days, when for a few miles drive it can locate its cars near an electric line. On the other hand, if outfit cars have their own lighting plants, they can be set out on spurs closest to job locations.

I am sure that the saving in extra time spent going to and from work, in hooking up extension cords, and in being moved around in switching service, would pay for an electric lighting plant in a year.

Uses for Mill Ends of Lumber

To what extent can mill ends of lumber be used in the repair and maintenance of railway buildings? What are the advantages of using such materials? Explain.

Handling Expense Too Great

By H. M. Harlow
Assistant General Supervisor, Bridges and Buildings, Richmond, Va.

We have never given any consideration to the use of mill ends of lumber for maintenance work on buildings. The mill end of a piece of lumber is, by its nature, short in length or of an inferior grade. Uses for short pieces of lumber arise often, but I do not consider it economical to stock such material. The purchase, inspection, storing and shipping expense connected with handling the material would, in my opinion, be more than the reduced price at the mill would justify. It would also, in most cases, require additional milling before use in a structure.

In practically all sizable shipments of lumber for maintenance use on a building there will be short lengths that will not be used on the job and which, generally, will fill all requirements for such material. The grade will then meet most requirements and no extra handling expense will be involved.

Many Uses for Shop Waste

By B. S. Couch
Carpenter, Bridge and Building Department, Louisville & Nashville, Bowling Green, Ky.

Mill-end lumber consists of short pieces from 3 to 5 ft. long that remain as scrap from planing-mill operations. Although it is doubtful if there would be any economy in obtaining this type of lumber from lumber companies, there is justification for using the random lengths usually "scrapped" at railroad car and locomotive shops.

Lumber of this length is useless in so far as shop work is concerned, but there are many uses to which it can be put in the B. & B. department. It can be used for underpinning section toolhouses and depots, for patching the edges of dwelling porch floors that have rotted out, and for renewing frostproof boxing around pipes under water tanks. The two by four's and larger timber can be used for bracing concrete forms, or for other purposes of a similar nature. If mill ends are not available for such repair work, it is necessary to cut up lumber of standard length and have some of that to waste.

These mill ends can be made available for use by the B. & B. department if someone at the shops is assigned to gather up, at the end of each day, all of the random-length lumber and store it in such a manner that it can be shipped out on orders sent in by bridge and building men. In writing our orders it is easy to designate the length as well as the purposes for which the lumber is desired.

Mill Ends Not Marketable

By A. H. Exon
Bridge and Building Supervisor, Southern, Somerset, Ky.

By mill ends of lumber the writer understands is meant the short pieces of lumber left over as a by-product of planing-mill operations. I have talked to lumber men throughout this section of the country and find that practically all of them are of the same opinion, namely, that this type of material is not marketable. These scraps of lumber are burned as waste.

Mill ends of lumber are usually of low quality, short lengths, and varying thicknesses. With the present cost of labor, it is very unlikely that any real economy could be derived from its use in the repair and maintenance of railway buildings. Some of this material might be utilized for blocking and bracing freight in cars at transfer sheds. At present, pine dunnage, consisting of two by four's below No. 2 common, is used for this purpose, and it is possible, depending on the price, that the amount of this lumber required could be reduced by using some mill ends of lumber.

Standby Material at Interlockings

To what extent should standby track material be provided at interlocking plants to make emergency repairs to switches, frogs, etc.? At passing sidings in C.T.C. territories? Explain.

Conditions Determine Amount

By R. G. Simmons
Assistant to Engineer Maintenance of Way, Chicago, Milwaukee, St. Paul & Pacific, Chicago

It is the general practice on most railroads to keep sufficient emergency repair material on hand at all interlocking plants to take care of any emergency. The amount of standby material necessary is determined by the plan of the interlocking plant, by the weight of track material in use, and by the conditions of the material in track.

If the layout is such that there are several rigid or movable-point railroad crossings at different angles, and several switches of different size, it is necessary to keep on hand emergency material to replace all pieces that are not interchangeable.

If the weight of the track material in track through an interlocking plant is of more than one weight, then it is necessary to increase the amount of emergency material on hand sufficient to take care of this difference in weight. Also, in some cases, railroad crossings will be laid with one weight of track material and a different weight of emergency material will be stocked. Where this is the case, considerable additional material will have to be kept on hand, such as compromise bars, batter rail, tie plates, etc.

Where the condition of the track material through an interlocking plant is worn, due to age or heavy traffic, it is advisable to keep a larger supply of emergency material on hand.

Usually the siding switches in Centralized Traffic Control territory are of the same weight of rail and size throughout one or more sections

or over several miles of track. Therefore, it is usually necessary to provide a minimum amount of emergency material. The distance between locations of this material will depend upon the facilities available to move it, when needed.

It is generally advisable to protect siding switches in C.T.C. territory so that emergency repairs can be made without undue delay. If the density of traffic is very heavy, it is very important that all switches in C.T.C. single-track territory be in operating condition all the time so that trains can be handled without delays. To insure this, more standby track material should be provided in C.T.C. territory than where conventional signaling is in operation.

Corrosion of Steel in Concrete

Under what circumstances does electrolytic corrosion of steel in concrete occur? What are its effects? How can it be prevented or diminished?

No Current, No Corrosion

By Randon Ferguson
Electrical Engineer, Research Staff, Engineering Division, Association of American Railroads, Chicago

The above question is answered, at least in part, by some work recently completed under an assignment from the Electrical section of the Engineering division of the Association of American Railroads. The work was done by the research staff of the division between 1943 and the present date by the writer. The assignment was to investigate corrosion of steel in concrete, specifically with regard to guys and footings of structures along railway tracks, and to recommend preventive measures. A major part of the test program was the testing of two consecutive field installations where steel was embedded in concrete cylinders under various conditions and current passed through the specimens to ground. The cylinders were 6 ft. in length and from 3 in. to 25 in. in diameter.

To obtain corrosion of the steel it was found necessary to have a flow of unidirectional current. When the current did not flow, or was alternating in direction, there was no corrosion. Specimens that had no voltage applied (and no current flow) showed no deterioration other than normal weathering. The same is true of the specimens having 60-cycle alternating current applied.

There were several effects of the current. A principal effect was the corrosion of the steel itself, which lost considerable weight. The loss of weight from the rod was decreased somewhat by the thicker coatings of the concrete. This reduction in loss of iron from the rod was the only noticeable improvement due to greater thickness of concrete about the rod, even for the 25-in. diamester specimens. The corrosion of the steel rod was attended by considerable expansion, which caused cracking of the concrete where electrolysis was present. There was also a deterioration of the concrete itself, which was most evident at the surface. The steel bar in the concrete was the anode (positive) and the cathode, or negative return, was through the ground to four buried rail sections at the corners of the test plot. The reverse polarity was not tried. Evidence has been found by other workers that the reverse polarity will affect the concrete differently. The deterioration of the concrete was ascribed to sulphate attack. Considerable sulphate was available from the cinders in the fill.

The best method to prevent electrolysis is the elimination of the flow of current. It is generally unfeasible to prevent the occurrence of stray potentials so the current must be stopped by insulation. The most effective means of insulation tried was a coating of asphalt applied to the rod or to the outer surface of the concrete specimen. It was found feasible to pour the specimens in an asphalt-impregnated membrane that line the forms used. Application of the asphalt to the rod proved equally effective as electrical insulation but many destroy the bond for tension forces. However, in case of the guys, a hook or plate may be placed at the end of the rod to give the required resistance to tension forces. The application of the asphalt insulation practically eliminated all flow of current and damage to the specimen.

Several of the things tried diminished the damage to the concrete or steel. The use of A.S.T.M. Type II composition cement with 0.015 per cent Vinsol resin solution, added for obtaining air entrainment, resisted the sulphate attack and reduced the deterioration of the concrete. Air entrainment had been reported as aiding resistance to sulphate attack and it was thought possibly it would also increase the electrical resistance of the concrete. However, the current flow was not impeded so there was some cracking due to the corrosion expansion of the steel. The use of stainless steel rod, as expected, eliminated the corrosion of the steel and the cracking of the concrete, but not the surface deterioration of the concrete. Of course, the use of stainless steel is not generally economically feasible. The use of wire mesh or steel encasement restrained the cracking to some extent.

It is perhaps in order here to mention some of the things that didn't work as a means of reducing the flow of current and electrolysis. Increasing the thickness of the concrete did not help appreciably, nor did richening the mix. Concrete in wet ground is a relatively good conductor. A number of commercial admixtures to the concrete and air entrainment were also ineffective in increasing resistance to current flow.

The so-called "cathodic" protection, which is being successfully applied to some underground structures for the prevention of electrolysis, was not tried in these tests. The cost of the damage to the structures involved in the assignment would probably not justify the expense of that type of protection. A discussion of this method by the Correlating Committee on Cathodic Protection was published recently in Bulletin 475 (Vol. 50 of Proceedings) of the American Railway Engineering Association

Caused by Flow of Current

By A. E. Archambault
Assistant Engineer, New York Central, New York

Electrolytic corrosion of steel in concrete is caused by stray d.c. current and a positive potential in the presence of an electrolyte. One ampere of such current will liberate 25 lb. of steel per year. The liberated steel will become oxidized and resulting expansion will cause the concrete to crack.

To prevent or diminish the corrosion of the steel, the current must be interrupted at its source or electrically drained to maintain it negative to earth or to other structures. It should also be free from contact with an electrolyte.

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SHOT BLASTED . . .

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PRODUCTS OF MANUFACTURERS

New, improved equipment, materials, devices

(For additional information on any of the products described in these columns, use postcards, page 459)

STEELOX BUILDINGS WITH SHED-TYPE ROOF

THE Armco Steelox prefabricated building, heretofore offered only with the gable-type roof, is now available with the shed-type roof. These buildings are manufactured by Armco Drainage & Metal Products, Inc., Middletown, Ohio. The new design eliminates need for wind bracing, thereby further simplifying assembly of the building and reducing costs.

Buildings with the new roof are available in sizes ranging from 4 ft. by 4 ft. to 12 ft. by 24 ft., and in eave heights from 6 ft. 8 in. to 8 ft. Standard single and double-swing doors, sliding doors and windows are provided as with the gable-roof Steelox buildings.

Armco Steelox prefabricated building with the shed-type roof

CHAIN SAW BLADES IN NEW SIZE RANGE

FIVE new lengths of chain-saw blades—20 in., 30 in., 40 in., 50 in., and 60 in.—all interchangeable, along with the 20-in. bow-saw attachment, on the same special 5-hp. McCulloch power unit, have been announced by McCulloch Motors Corporation, Los Angeles, Cal.

The blades, made of tool steel, are chrome plated to resist rust. The chain track is accurately milled in each blade. To assure accurate placement of the chain track, each blade is surface ground on both sides before the track is machined.

BUCKET CONTROLLED BY HYDRAULIC POWER

THE Oliver Corporation, Cleveland, Ohio, has developed a hydraulically-operated front-end loader, with a hydraulically controlled bucket, for use with the company's small crawler tractors—the Oliver Cletrac Model A and the Model HG.

According to the manufacturer, with hydraulic control the working area can always be kept level, a full bucket can always be obtained, the bucket level is maintained automatically when lifting the load, and trouble with springs, latches, chains and trip cables is eliminated. Other features of the hydraulic control include a high "breaking out" power and a high degree of discharge control.

IMPROVEMENTS TO FAIRMONT WEED BURNER

FAIRMONT Railway Motors, Inc., Fairmont, Minn., has announced a number of improvements in the design of its W55 Series A weed burner. These improvements include: (1) A new gear-type fuel-oil pressure pump with two long bearings for both the drive shaft and the idler shaft, which is said to have a longer life; (2) a new strainer for the fuel pressure pump intake line, which is reported to have better op-

(*Continued on page* 496)

The Oliver Cletrac Model A tractor with hydraulically-operated front-end loader

THE NORDBERG GAGING TEAM

Spike Hammer and Trakgager--Our Latest Development

The two Nordberg SPIKE Hammers working in tandem drive up to 1600 spikes per hour. Every spike is driven straight. Spikes are not overdriven. When used for finish spiking, the operator quickly swings the driving head to the inside or outside of the rail to reach holding and plate spikes.

The Nordberg GAGING TEAM consists of one man operating the TRAKGAGER and the SPIKE HAMMER operator with two men holding spikes for driving. These two machines and four men will gage as much track as three teams of 3 men each gaging by hand. Thus, the Nordberg Gaging Team of 4 men will replace a hand gaging crew of 9 men. Rail spiked with the Nordberg Gaging Team is exceptionally accurate to gage because the rail is securely held while it is being spiked.

This teamwork of SPIKE HAMMER and TRAKGAGER is another modern Nordberg development which increases production and improves quality of track work. For twenty years, Nordberg has been building maintenance-of-way machinery — machinery that has helped establish the now accepted fact that track maintenance machines reduce costs necessary for the preservation of our railroads. Call or write Nordberg for track maintenance literature.

NORDBERG MFG. CO.

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NORDBERG TRACK MAINTENANCE MACHINES

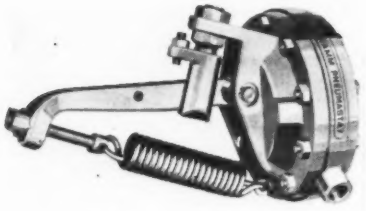
ADZING MACHINE • SPIKE PULLER • TRACK WRENCH • SPIKE HAMMER
RAIL DRILL • POWER JACK • CRIBEX • RAIL GRINDER • TRACK SHIFTER

The improved Fairmont W55 Series A weed burner

erating characteristics; (3) a sturdier rubber mounting for the blower engine unit; (4) synthetic rubber construction of three of the main fuel lines, making them easier to handle and install; and (5) a more readily accessible grease fitting for the clutch throw-out bearing on the propelling engine.

SPEED REGULATOR FOR AIR COMPRESSORS

FUEL savings in air-compressor operation averaging up to 50 per cent are said to be possible with the use of the Pneumostat, a new feature



The Schramm Pneumostat

offered by Schramm, Inc., West Chester, Pa., on its line of portable, engine-driven compressors, including Models 105, 210, 315 and 420.

The Pneumostat is designed to regulate the speed of the compressor in accordance with the demand for air. As pressure increases, the Pneumostat is said to function to move the throttle to a new position, thereby reducing the speed of the compressor. Thus the compressor operates continuously from about one-half speed to full speed with loading and unloading, thereby eliminating, at part load, the cycling between full speed and idle speed.

HARDFACING ALLOYS

A NEW line of hardfacing welding rods, consisting of 15 different alloys, has been announced by the Air Reduction Sales Company, New York. These alloys are divided into three primary groups, —viz, ferrous alloys, cobalt-base alloys and tungsten carbide. In introducing the new Airco line, the manufacturer is offering a trial assortment containing a quantity sufficient to assure an adequate performance test.

The alloys included in the trial assortment are: (1) The new Aircolite hardfacing alloy, recommended for equipment subjected to severe abrasion and medium impact (for both oxyacetylene and electric-arc application); (2) the Airco self-hardening alloy, for equipment subjected to severe impact and abrasion (for electric-arc application).

For additional information on any of the products described on this page, use postcards, page 459.

New Books

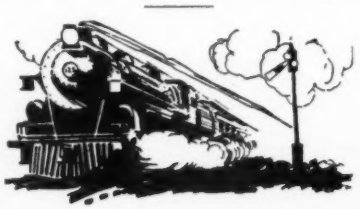
TIMBER DESIGN

TYPICAL Designs of Timber Structures. 1949 edition. 114 pages. 9 in. by 13 in. Illustrated. Bound in paper. Published by the Timber Engineering Company, Washington, D.C. Price $10.

THIS volume is intended as a guide for engineers and architects concerned with the design of light and heavy-frame timber structures. It includes 94 typical drawings of such structures as roof trusses of several types, bridges, towers, wharves, trestles, houses and small buildings. While the drawings are typical, the book tells how these designs may be modified to suit any particular requirement.

Among the designs included are nine examples of trussed rafters, 34 examples of pitched roof trusses for spans up to 80 ft., 13 examples of flat roof trusses for spans up to 80 ft., 3 examples of the Lank-Teco truss, said to be highly economical for roof spans up to 60 ft., and 11 examples of bow-string trusses for spans up to 120 ft.

In addition, the book contains a number of miscellaneous designs.



Of interest to railway men are those of highway bridges for 18-ft. roadways and spans up to 70 ft., a footbridge of 50-ft. span, a trestle designed for E-45 or E-60 loading, and typical wharf and revetment details.

While the cost of the volume is listed at $10, the publisher will make free distribution to railway architects and engineers who apply for copies on their company letterhead.

DEFECTS IN STEEL RAILS

RAIL Defect Manual—Compiled by Sperry Rail Service for the Use of the Railroads. Fourth edition. 52 pages, 70 illustrations. Bound in flexible covers. Published by Sperry Products, Inc., Danbury, Conn.

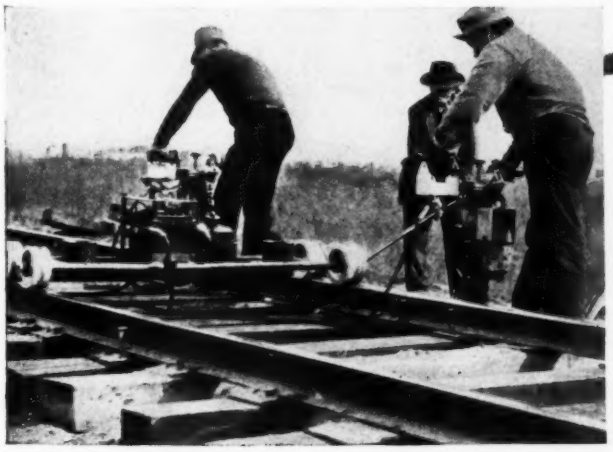
IN the most recent revision of this well-known and authoritative handbook on the origin, rate of growth, external indications and hazards of each of the various internal and external defects occuring in steel rails, the text has been completely rewritten to incorporate the latest details of rail-defect classification and data accumulated since the publication of the third edition in 1942. It also includes interesting supplementary chapters on the history of rails and railroads, the development of rail-testing programs and on rail breaking as a check on testing methods.

DOES NOT INTERFERE WITH RAIL TRAFFIC...

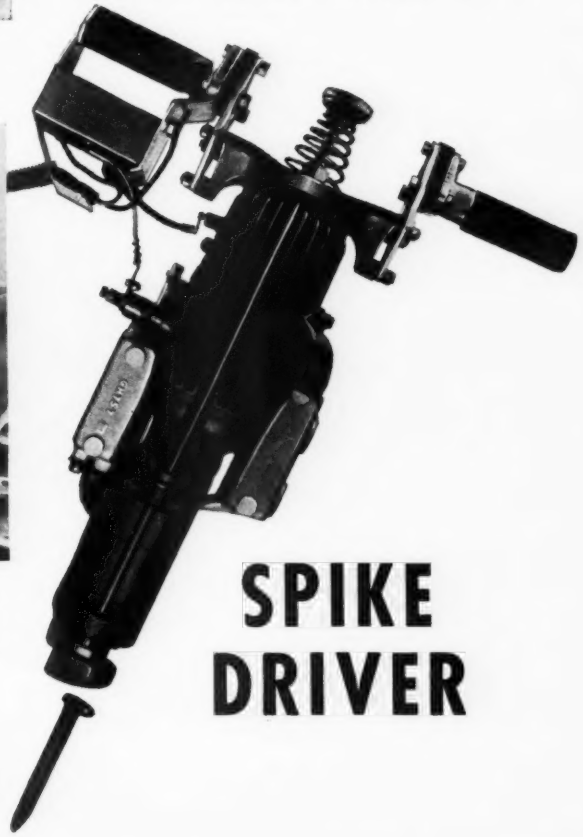
The **BARCO** *Spike Driver*

The Barco Spike Driver may be used singly or in a crew. It does not interfere with rail traffic, as is the case with large equipment.

Here's the spike driver that's built to do a faster, better job and cut down operating costs. Light in weight, strongly yet compactly built, the Barco does not interfere with rail traffic, as one man may lift the carriage on or off the track. Barco drives anchor spikes and spikes around turnouts, cross-overs and inter-locking switches. It can be operated by one man, with or without the carriage. For further information write Barco Manufacturing Company, 1805 Winnemac Avenue, Chicago 40, Illinois. In Canada: The Holden Co., Ltd., Montreal, Canada.



If desired, this light track carriage may be used. It can quickly be removed from the track for passing trains, and can hold one or two spike drivers. Particularly desirable for scattered spike driving such as renewing ties.



SPIKE DRIVER

BARCO

FREE ENTERPRISE—THE CORNERSTONE OF AMERICAN PROSPERITY

THE MONTH'S NEWS

Happenings among the railways—the associations—the suppliers

Changes in Railway Personnel

General

J. A. Zullinger, supervisor of track on the Pittsburgh division of the Pennsylvania, with headquarters at Johnstown, Pa., has been promoted to night assistant trainmaster on the Eastern division, with headquarters at Canton, Ohio.

E. C. Gegenheimer, assistant chief of personnel of the Pennsylvania, and an engineer by training and in his earlier railway experience, has been appointed acting director of public relations, with headquarters as before at Philadelphia, Pa.

George W. Svoboda, assistant superintendent of the Charleston district of the Atlantic Coast Line, and an engineer by training and experience, has been advanced to superintendent of that district, with headquarters as before at Charleston, S.C.

Engineering

E. Eriksen, assistant bridge engineer of the Canadian National, with headquarters at Toronto, Ont., retired recently after 28 years service.

J. H. Schoonover, draftsman on the Delaware, Lackawanna & Western at Buffalo, N.Y., has been appointed assistant engineer, with headquarters at Scranton, Pa.

Mark H. Corbyn has been appointed engineer, grade crossings on the Chicago, Rock Island & Pacific, with headquarters at Chicago, succeeding **A. E. Korsell,** who has retired.

J. N. Smedton, engineer accountant on the Canadian National, with headquarters at Montreal, Que., has been promoted to valuation engineer, at Toronto, Ont., succeeding **F. C. Knight,** whose death was reported in the March issue.

J. F. Dunseth, track supervisor on the Baltimore & Ohio, with headquarters at Zanesville, Ohio, has been promoted to assistant division engineer of the Toledo division, with headquarters at Dayton, Ohio, succeeding **C. E. Herth,** who has retired.

Robert L. Groover, chief engineer of the Atlantic Coast Line, with headquarters at Wilmington, N.C., has been appointed, also, chief engineer of the Winston-Salem Southbound, succeeding **D. B. Packard,** whose death is reported elsewhere in these columns.

R. R. Pregnall, Jr., senior assistant engineer on the Atlantic Coast Line, has been promoted to division engineer maintenance of way at Rocky Mount, N.C., succeeding **A. V. Hooks, Jr.,** whose appointment as acting roadmaster is noted elsewhere in these columns.

F. P. Filippelli, whose promotion to engineer maintenance of way of the Eastern Pennsylvania division of the

F. P. Filippelli

Pennsylvania, with headquarters at Harrisburg, Pa., was announced in the February issue, was born at Harrisburg on March 17, 1893. He attended Pennsylvania State College, graduating in civil and sanitary engineering in 1915 and in September, 1915, entered the service of the Pennsylvania Steel Company as a draftsman in the frog and switch department at Steelton, Pa. He entered the service of the Pennsylvania on May 1, 1917, as a draftsman on the Philadelphia division at Harrisburg, being promoted to rodman on August 1 of that year. He was advanced to assistant supervisor of track on June 20, 1918, and served in that capacity at Titusville, Pa., Columbia, Pa., Bordentown, N.J., and Baltimore, Md., until November 10, 1928, when he was promoted to supervisor of track at Jamesburg, N.J. Later he served as supervisor at Jersey City, N.J., Trenton, N.J., and New York. Mr. Filippelli was advanced to assistant division engineer of the Baltimore division, at Baltimore, on January 1, 1936, and later served in this capacity on the Maryland division at that point. He was further advanced to division engineer of the Toledo division on July 1, 1943, with headquarters at Toledo, Ohio, and was transferred to the Philadelphia division, at Harrisburg, in 1945, holding the latter position at the time of his recent promotion.

E. R. Robertson, Jr., draftsman on the Pittsburgh & Lake Erie, has been advanced to engineering inspector, succeeding **J. H. Twitmyer,** who has, in turn, been promoted to assistant engineer to replace **R. H. George,** who retired on March 31. All of the above have headquarters at Pittsburgh, Pa.

Robert T. Spaulding, track supervisor on the Boston & Maine, with headquarters at Mechanicville, N.Y., has been promoted to acting assistant division engineer of the New Hampshire division, at Concord, N.H., succeeding **Oscar C. Benson,** who has been advanced to construction engineer in charge of the Wilder Dam project, with headquarters at Norwich, Vt.

A. G. Hibbard, roadmaster on the Canadian Pacific at Ottawa, Ont., has been promoted to division engineer of the Montreal Terminals division, with headquarters at Montreal, Que., succeeding **N. M. Kelly. A. K. Rountree** has been appointed assistant engineer on that division to succeed **R. S. Allison,** whose appointment as assistant roadmaster is noted elsewhere in these columns.

Garrett A. Honey, recently appointed assistant general manager maintenance of way of the Alabama, Tennessee & Northern, with headquarters at York, Ala., as noted in the February issue, was born on November 3, 1890, at Stoutland, Mo. He entered railway service on August 1, 1913, as a track laborer on the St. Louis-San Francisco. He served as section foreman and extra gang foreman between April 1, 1918, and January 1, 1930, becoming roadmaster at Memphis, Tenn., on the latter date. He was later transferred in this capacity to Newburg, Mo., where he remained until his recent appointment as assistant general manager maintenance of way of the A.T.&N.

(*Please turn to page* 500)

Howdy Men—

"Shake Hands with Your New Chief Engineer"

"YOU AND I HAVE A JOB TO DO—THE MANAGEMENT WANTS US TO GIVE THIS RAILROAD A ROADBED LIKE WE HAD ON THE ———— RAILROAD."

"You men know that I just left that railroad to head up the maintenance department of this road. We had a cast iron rule—Section men must not touch grass or weeds. We always figured it's ridiculous to use our labor for weed control work when the Reade Company with their large capacity spray train would average some hundred miles per day of double track and take in passing tracks."

"That rule goes for me and I hope to persuade our management to permit me to have our roadbed sprayed with chemical weed killer by the Reade Company."

"If any of you men have seen the modern spray train in operation you will appreciate it when I state that this is my idea of accomplishment in weed control work."

"A man must study the benefits of applying chemical weed killer to fully appreciate the tremendous savings it makes possible for any railroad. An inspection a year after the roadbed has been sprayed will disclose the benefits that this type of weed control program contributes. In fact, our track was practically clean after we used the Reade product for several years."

"We continued to spray over the full width of the roadbed on the theory that having completely cleaned out the weeds, it would be good business on our part to continue the spraying to assure that no new growth found its way into the roadbed."

This man brought with him experience which would prove of great value in assuming his duties as the Chief Engineer in a new assignment.

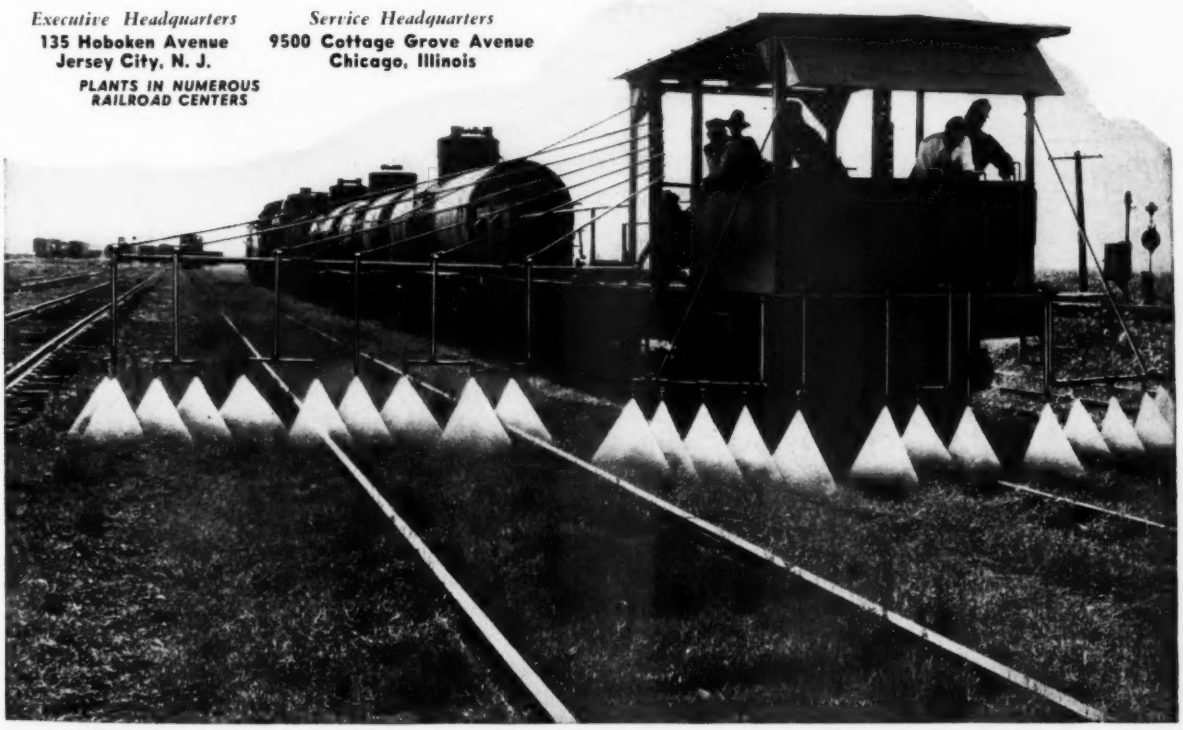
Perhaps weed killing service is badly needed on your track.

READE MANUFACTURING COMPANY, INC.

Executive Headquarters
135 Hoboken Avenue
Jersey City, N. J.

Service Headquarters
9500 Cottage Grove Avenue
Chicago, Illinois

PLANTS IN NUMEROUS RAILROAD CENTERS



Railway Personnel (Cont'd)

Russell A. Shier, whose promotion to division engineer of the Canadian National at Hornepayne, Ont., was reported in the April issue, was born on January 3, 1913, at Los Angeles, Cal., and was educated at Queen's University, Kingston, Ont., receiving a B.S. degree in civil engineering. Mr. Shier began his engineering career in 1930 with the Godson Contracting Company of Toronto, Ont., and later worked for the Ontario Department of Highways. He entered the service of the C.N.R. in May, 1940, as an instrumentman, but left the railroad in 1942 to enter the armed forces. On returning from military service, in January, 1946, he became assistant engineer on the St. Thomas division, remaining in that assignment until August of that year, when he was appointed supervisor of way and structures of the Niagara, St. Catharines & Toronto (a subsidiary of the Canadian National), with headquarters at St. Catharines, Ont. In May, 1948, he returned to the C.N.R. as assistant division engineer of the Belleville division where he remained until his recent promotion.

Joseph Watkins Hale, whose appointment as assistant to the chief engineer of Atlantic Coast Line, at Wilmington, N.C., was announced in the March issue, was born in Louisburg, N.C., on December 24, 1896. He was educated at the University of North Carolina and entered the service of the A.C.L. on March 26, 1923, as a resident engineer on construction work. From December, 1924, until June, 1928, he served in the maintenance of way department as junior engineer and assistant engineer and then became assistant engineer—reproduction costs. He became office engineer—maintenance of way in June, 1933, and was promoted to division engineer, maintenance of way at Savannah, Ga., in February, 1939. Mr. Hale became roadmaster at Dillon, S.C., in October, 1940. He entered the army in July, 1942, and has been hospitalized since the close of the war. He was released from the army in January and, on returning to the A.C.L., was appointed assistant to the chief engineer.

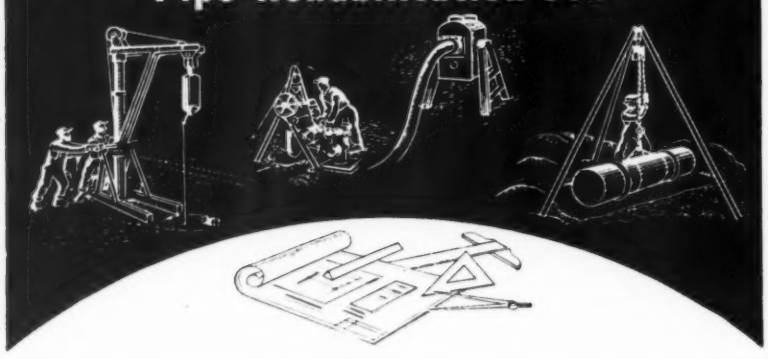
Joseph Watkins Hale

C. W. Reeve, whose promotion to division engineer of the Champlain division of the Delaware & Hudson, with headquarters at Plattsburg, N.Y., was announced in the April issue, was born on July 6, 1904, at Philadelphia, Pa. He attended Union College, graduating in 1928, and entered the service of the D.&H. in June of that year in the bridge and building department at Carbondale, Pa., transferring to the Saratoga division at Albany, N.Y., as transitman in January, 1929. He was appointed track supervisor at Oneonta, N.Y., in May, 1941, and became bridge and building supervisor of the Susquehanna division, at Oneonta, in January, 1947. Mr. Reeve was advanced to engineer of track, with headquarters at Albany, in July, 1947, and held that position until the time of his recent promotion.

J. Conrad has been appointed division engineer of the Kamloops division of the Canadian National, with headquarters in Kamloops, B.C. He succeeds **Murray M. Churchill,** retired. Born at St. Moritz, Switzerland, Mr. Conrad was educated in primary and high schools there. He later attended a technical school at Coire, Switzerland, and took special courses at the University of Zurich, following which he did postgraduate work in civil engineering at universities in France, Germany and Italy. Between courses he gained practical experience on highway construc-

(*Continued on page* 502)

Some of the equipment necessary for a Complete Pipe Rehabilitation Job



The engineering department of Pittsburgh Pipe Cleaner Company has the equipment necessary to do a complete rehabilitation job on any water or sewer system. Past records of completed jobs and years of research and experience make it possible for us to do a better job.

WATER DEPARTMENT

CITY OF CHARLOTTE, N.C.

17,000 feet—24" Main

Before Cleaning "C" Value..... 69
After Cleaning "C" Value.....130
After Coating "C" Value.....130

G.P.D. Before Cleaning 5.6 M.G.D.
G.P.D. After Coating 10.4 M.G.D.
4.8 M.G.D.—INCREASE

LARGE EASTERN CITY

24" Main

Before Cleaning "C" Value..... 69
After Cleaning "C" Value.....146

G.P.D. Before Cleaning 5.6 M.G.D.
G.P.D. After Cleaning 10.6 M.G.D.
4.8 M.G.D.—INCREASE

CLEVELAND, OHIO

25,000 feet—16" Main

Before Cleaning "C" Value..... 62
After Cleaning "C" Value.....121

10,000 feet—24" Main

Before Cleaning "C" Value..... 81
After Cleaning "C" Value.....122

35,000 feet—30" Main

Before Cleaning "C" Value..... 86
After Cleaning "C" Value.....130

LARGE SOUTHERN CITY

3,000 feet of 20" Cement-lined Water Mains

Before Cleaning "C" Value..... 93
After Cleaning "C" Value.....146

PITTSBURGH PIPE CLEANER CO.
133 Dahlem St., Pittsburgh 6, Pa.
BALTIMORE • BIRMINGHAM • BOSTON • BRADENTON, FLORIDA • BUFFALO • CHARLOTTE
CHICAGO • CINCINNATI • DETROIT • HOUSTON • NEW YORK • PHILADELPHIA • ST. LOUIS

MONOTUBES bring foundation costs down to earth!

● If you're looking for ways to cut foundation costs—specify *Monotubes.* Cost-conscious engineers and builders have proved on job after job that the exclusive advantages of Monotubes reduce costs . . . save time. Here are 5 reasons why:

The fluted, tapered design speeds driving.
They're easily extendible to any required length, *right on the job.*
Thorough inspection is quick and easy before concreting.
Light in weight, they are easily and quickly handled.
Their sturdy construction eliminates use of driving mandrell.

Check over every time-saving, money-saving feature. You'll see how Monotubes bring foundation costs "down to earth". Available in gauge, size, and taper to meet varying soil conditions. Send for complete information. Your inquiry will be answered promptly. Write The Union Metal Manufacturing Company, Canton 5, Ohio.

UNION METAL

Monotube Foundation Piles

New Light Weight POWER FOR FASTER TRACK WORK

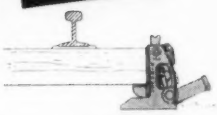
Aluminum Alloy

Simplex No. A5

UNIVERSAL TRACK JACK

Speeds

TAMPING—BALLASTING



SURFACING

LINING

Greater portability—weighs only 28 lbs.—with no sacrifice of strength, makes this jack a "must" for maintenance-of-way crews doing more work faster. Simplex No. A5 has 15 tons capacity, large forged toe lift surface of 2½" x 3¼". Simplex-engineered, aluminum alloy housing, reinforced at stress points, has the strength of malleable jacks weighing 45% more!

• SIMPLEX A17 TRACK JACK

Aluminum Alloy Housing—41½ lbs. Light—15 Tons Strong!

For general track jacking. Built with 40% extra support at stress points to equal strength of malleable jacks that are 45% heavier! Large toe lift area (2½" x 3¼") permits jacking under ends of ties without damage. Shorter fulcrum center. Safety thumbguard. Lifts full capacity on cap or toe! Height 22¾" with 13" lift.

SIMPLEX RAIL EXPANDERS

One man with No. 550 replaces rail pounding crew. Avoids battered rail ends, bolts or crossings. Easy to operate. 25 tons capacity. (Also available in two other models of 15 and 30 tons capacity.)

SIMPLEX SAFETY JACK SUPPORTS

Made of aluminum alloy. Only four needed to handle safely the heaviest structure. Far stronger than wooden wedges. Use as shown or inverted with Simplex Standard Speed Journal or Bridge Jacks.

Simplex LEVER • SCREW • HYDRAULIC Jacks

1899 50 Years 1949

TEMPLETON, KENLY AND COMPANY
1026 South Central Ave., Chicago 44, Illinois

Railway Personnel (Cont'd)

tion. Mr. Conrad joined the Canadian National engineering department at Vancouver in 1928. Since then he has been employed as bridgeman, chainman, rodman, inspector, instrumentman, resident engineer, assistant bridge engineer and assistant district engineer, holding the latter position at the time of his recent promotion.

John E. Chubb, whose promotion to division engineer of the Toledo division of the Pennsylvania, with headquarters

John E. Chubb

in Toledo, Ohio, was announced in the March issue, was born in Edgewood, Pa., on July 12, 1912. He graduated from Ohio State University in 1935 and, on June 20 of that year, entered the service of the Pennsylvania as a trackman on the Columbus division. On August 29 of that year he became engineer apprentice on the Middle division, at Lewistown, Pa., and later served at Baltimore, Huntingdon, Pa., Johnstown, Pa., and on the Eastern Region rail train. Mr. Chubb was promoted to assistant supervisor of track at Buffalo, N.Y., on May 10, 1937, and subsequently was assigned to Enola, Pa., Wilmington, Del., and Philadelphia, Pa. He became supervisor of track at Cincinnati, Ohio, on February 15, 1942, and was transferred to New York on November 16, 1944. On July 1, 1948, he became assistant division engineer of the Maryland division at Baltimore, Md., the position he held at the time of his recent promotion.

Track

Roy Stephenson, acting roadmaster on the Chicago, Rock Island & Pacific at Enid, Okla., has been appointed roadmaster at St. Joseph, Mo., succeeding **D. W. Bickett,** deceased.

A. V. Hooks, Jr., division engineer maintenance of way on the Atlantic Coast Line, with headquarters at Rocky Mount, N.C., has been appointed acting roadmaster in charge of rail-laying operations on the Northern division.

(*Please turn to page* 504)

Check these important improvements found only in LUFKIN CHROME CLAD STEEL TAPES

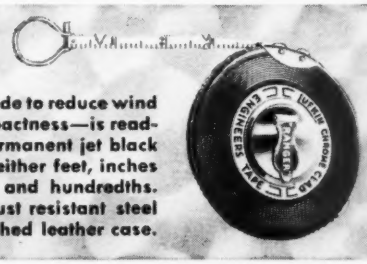
Years of rugged testing in civilian and war-time usage have proved Lufkin Chrome Clad Steel Tapes to be an outstanding development in measuring tapes. Before you buy another steel tape, ask your dealer to show you a Lufkin Chrome Clad tape. See the many advantages which they offer—features never before found in a steel tape. For example:

Features every tape user wants

1. Hardened steel tape—tough—flexible—kink-resistant—protects against line breakage, saving valuable time and repair expense.
2. Rust resistant coating.
3. Multiple coats of electroplating give added protection against corrosion.
4. Heavy chrome plating with non-glare satin finish—will not crack, chip or peel. Durable jet black markings stand out sharply against this light-absorbing surface—easy to read in any light.
5. Markings are bonded to the steel base and are sunk below the chrome surface thus protecting them against wear even on concrete or gravel.

Buy steel tapes with easy to read markings that are durable

"RANGER" Model... Lufkin's Chrome Clad tape specially designed for engineers. The sturdy steel line—only ¼" wide to reduce wind resistance and provide compactness—is readily detachable from case. Permanent jet black markings are available in either feet, inches and eighths or feet, tenths and hundredths. Zero falls at end of line. Rust resistant steel liner protected by hand stitched leather case.



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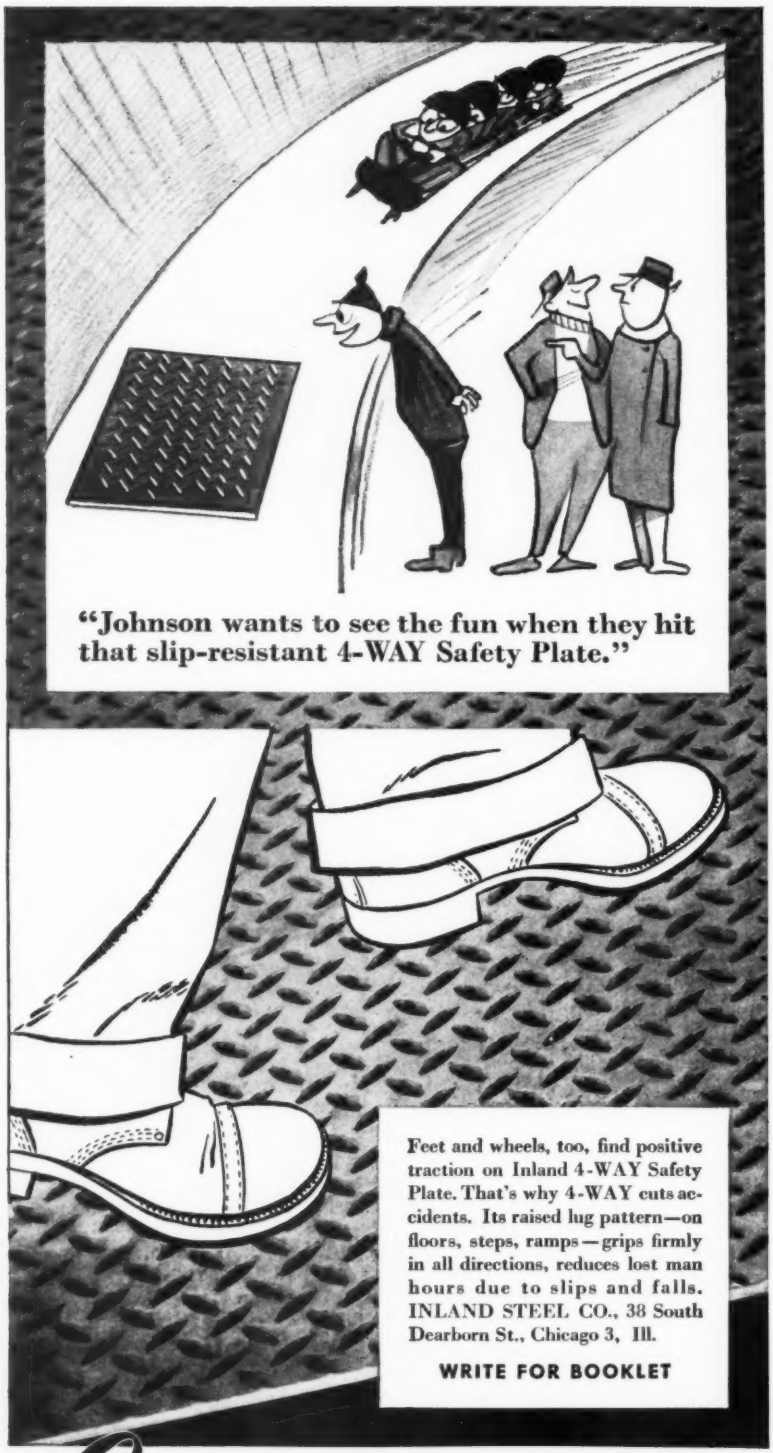

"Johnson wants to see the fun when they hit that slip-resistant 4-WAY Safety Plate."
Feet and wheels, too, find positive traction on Inland 4-WAY Safety Plate. That's why 4-WAY cuts accidents. Its raised lug pattern—on floors, steps, ramps—grips firmly in all directions, reduces lost man hours due to slips and falls. INLAND STEEL CO., 38 South Dearborn St., Chicago 3, Ill.
WRITE FOR BOOKLET
Inland
4-WAY
SAFETY PLATE
STOCKED BY LEADING STEEL WAREHOUSES
Reg. U. S. Pat. Off.

Railway Personnel (Cont'd)

Walter Marcus Matheney, supervisor of track on the Cleveland, Cincinnati, Ohio & St. Louis, at Mattoon, Ill., retired recently after 40 years service.

C. E. Davis has been appointed roadmaster on the Atchison, Topeka & Santa Fe, with headquarters at Slaton, Tex., succeeding **C. E. Brown,** who has resigned.

R. S. Allison, assistant engineer on the Montreal Terminals division of the Canadian Pacific, has been appointed assistant roadmaster on that division, with headquarters at Montreal, Que., succeeding **J. D. Bromley,** promoted.

J. F. Donat Soucy has been appointed assistant track supervisor on the Portland division of the Boston & Maine, with headquarters at Dover, N.H., to succeed **Earl A. Stewart,** who has been advanced to supervisor in charge of the 1949 resurfacing program on the Portland division, with headquarters as before at Dover. **William S. Cooper** has been appointed acting track supervisor at Mechanicville, N.Y., replacing **Robert T. Spaulding,** whose promotion to acting assistant division engineer is noted elsewhere in these columns.

Leslie G. Sharpe, whose promotion to roadmaster on the Georgia division of the Seaboard Air Line, with headquarters at Hamlet, N.C., was announced in the March issue, was born in Mingo, W.Va., on November 8, 1906, and received his higher education from the International Correspondence Schools. He entered the service of the Seaboard as a section laborer on January 2, 1930, and was advanced to apprentice section foreman on June 18, 1931. Later, he served as relief section foreman, assistant foreman on the system rail gang, extra-gang foreman and section foreman until October 20, 1947, when he became foreman of the system rail gang. He was advanced to assistant roadmaster at Henderson, N.C., on March 22, 1948, where he remained until his recent promotion.

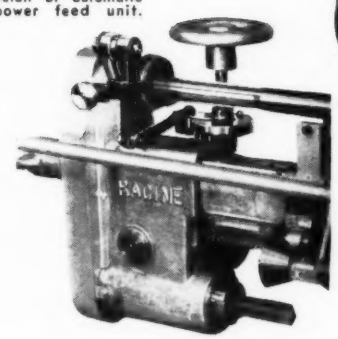
H. T. Alexander, assistant supervisor of track at Mansfield, Ohio, on the Eastern division of the Pennsylvania, has been promoted to supervisor of track on the Buffalo division, at Olean, N.Y., succeeding **W. J. Ott,** who has been transferred to Johnstown, Pa., on the Pittsburgh division, where he succeeds **J. A. Zullinger,** whose promotion to night assistant trainmaster is mentioned elsewhere in these columns. **H. F. Long,** junior engineer on the Fort Wayne division, at Fort Wayne, Ind., has been promoted to assistant supervisor of track on the Williamsport division, at Williamsport, Pa., where he replaces **P. N. Kulick.** Mr. Kulick has been transferred to Mansfield to succeed Mr. Alexander. **C. G. Weinel, Jr.,** junior engineer on the Eastern division, has been promoted to assistant supervisor of track on the Chicago Terminal division at Colehour, Ill., succeeding **J. T. Cooper,** who has been transferred to Philadelphia, Pa.

(*Please turn to page* 506)

Light-Powerful RACINE Portable Rail Drill

with **AUTOMATIC POWER FEED**

Detail of automatic power feed unit.



This powerful, compact, precision built horizontal type drill is designed to simplify and speed up rail drilling in track and rail maintenance repair work. Because of its light weight, roller mounted design, this new rail drill can be handled by just one man. Speeds up drilling operations and reduces man-hour costs.

CONSTRUCTION AND OPERATING FEATURES

★ Powered by a 2½ H.P. 4 cycle gasoline engine connected to drill chuck through a 30 to 1 reduction gear. Adequate power for drilling holes through any rail web in less than two minutes. Engine has built-in high tension fly wheel magneto that insures quick easy starting.

★ Quick-acting powerful clamps hold machine in position on rail. Clamping automatically aligns machine. Drill bit is always properly positioned and securely in place. Position of drill is adjustable for all rail sizes. Lubrication is provided by a grease reservoir that encloses gears and drill spindle.

★ Drill bit is protected by automatic release feature of the feed unit. Quick-acting drill holder provides ease in changing drills.

★ Easy to handle. Carrier guard protects operating mechanism and provides a means for lifting machine onto track cars or quick removal from rail in cases of emergency. Total weight less than 165 lbs.

★ A single adjustable carrier places the traction wheels of drill in contact with rail. Can be easily rolled from one joint to the next without lifting from rail.

★ Automatic spring pressure power feed can be set for proper feeding rate for various size drills and web thicknesses. Insures uniform pressure and longer drill life. Hand feed is also available when needed.

Write for your copy of our new 711 Railway Maintenance Machines Catalog. Address Racine Tool and Machine Co., 1738 State St., Racine, Wis.

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Safeguard

Rolling Stock, Bridges, Tanks, Towers Metal Buildings, Signal Equipment and Other Properties Against COSTLY RUST!

Nothing equals Rust-Oleum —*the proved rust preventive* —for the lasting protection of metal—especially in closed or inaccessible areas where condensation due to temperature changes breeds rust.

RUST-OLEUM

Stops Rust!

- Rust-Oleum cuts preparation time. No sandblasting or chemical cleaners are necessary.
- Rust-Oleum outlasts ordinary materials two to ten times depending on conditions.
- Easy to use — Rust-Oleum assures lasting protection that resists rust-producing conditions.
- Apply by brush, dip or spray . . . in less time. Also available in small container sizes for economical distribution and field use.

Day and night—twenty-four hours a day—rust attacks railroad properties. Stop its deadly ravages by providing Rust-Oleum protection. Rust-Oleum coats metal with a tough, pliable moistureproof film that lasts years longer. *It's the proved answer to many rust problems.*

Rust-Oleum can be applied effectively and economically on all metal surfaces now in service—even where rust has already started. Merely wire-brush to remove scale and loose rust. Rust-Oleum merges the remaining rust into a rust-resisting, durable coating that defies time and the elements.

Save time and labor. Avoid frequent and costly replacements. Protect your properties with Rust-Oleum. Specify Rust-Oleum on new equipment, for re-building jobs . . . and for maintenance.

Get the facts now! Write for catalog containing complete information and recommended applications. Tell us your specific rust problems and we will gladly send you definite suggestions for Rust-Oleum applications.

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Railway Personnel (Cont'd)

Leslie G. Workman, general foreman on the Baltimore & Ohio at Dover, Ohio, has been promoted to track supervisor at Wheeling, W.Va., where he succeeds **J. F. Hobbs,** who has been transferred to Point of Rocks, Md., replacing **C. W. Sole.**

William Glavin, whose promotion to supervisor of track on the Grand Rapids division of the Pennsylvania, with headquarters at Kalamazoo, Mich., was noted in the March issue, was born on September 8, 1920, at Lancaster, Pa., and graduated from Pennsylvania State College in 1942. He first entered the service of the Pennsylvania during summer vacation in 1941, when he served as chainman on the New York division and the following year he became engineer apprentice on that division. He served in the Corps of Engineers, U.S. Army, from September, 1942, to July, 1946, being discharged with the rank of captain. On returning to railway service, he was assigned as assistant on the engineer corps at New Brunswick, N.J. He was promoted to assistant supervisor of track at Williamsport, Pa., in January, 1947, and was transferred in that capacity to the main line of Maryland division, at Perryville, Md., in May of that year, remaining at the latter point until the time of his recent promotion to supervisor of track.

Alexander Salerno, whose appointment as roadmaster on the Chicago & Western Indiana, with headquarters at Chicago, was reported in the March issue, was born in Italy on January 12, 1893, and entered railroad service in April 1, 1909, as a track laborer on the Chicago & North Western. He later served in the same capacity on the Pennsylvania and the Chicago, Milwaukee, St. Paul & Pacific, and in March, 1913, went with the C. & W. I. as a track laborer at Chicago. Mr. Salerno subsequently advanced through the positions of assistant foreman, track foreman and track supervisor, and in February, 1929, was appointed assistant roadmaster at Chicago. In June, 1932, because of reduction in forces, he was appointed extra gang foreman, and in January, 1948, he was again promoted to assistant roadmaster, the position he was holding at the time of his recent appointment as roadmaster.

Albert F. Brandon, section foreman on the Southern at South Hill, Va., has been promoted to track supervisor at South Clarksville, Va., succeeding **J. T. Hiner. J. Ben Hutcheson,** track supervisor at Somerset, Ky., has been transferred to Dayton, Tenn., where he succeeds **Henry Petrie,** who has been moved to Jackson, Ala., to replace **Edward R. Davis,** who, in turn, has been transferred to Wilton, Ala., where he succeeds **Theodore Van Sprecken, Jr.** Mr. Van Sprecken has been moved to New Albany, Ind., succeeding **Robert B. Rust, Jr.,** transferred to Lexington, Ky.

(*Please turn to page* 508)

The Train of Tomorrow

on VAPOR DRIED* TIES of TODAY

Oak Crossties Vapor-Dried and Treated with ten pounds, 30/70 Creosote-Petroleum by Taylor-Colquitt Co. September 1948.

On The Clinchfield

Vapor-Drying offers you these advantages:

Deeper penetration and better distribution of the preservative.
Reduces losses from checking and splitting.
Complete sterilization of ties and timber—protection against decay.
Smaller inventories—less insurance and interest.
From tree to track in hours, instead of months.

Vapor Drying Is Timber Conservation

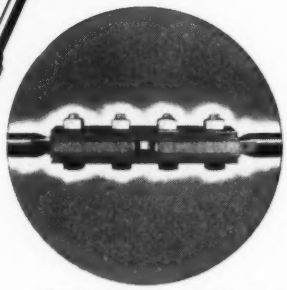
*Process Pat'd

TAYLOR-COLQUITT CO.
SPARTANBURG, SOUTH CAROLINA

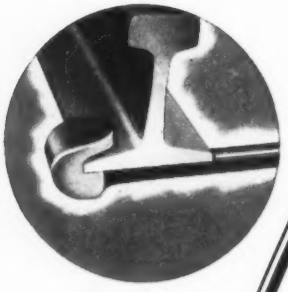
For longer tie life, less regaging— use

Malleable iron rail jaw. Available with double grip also.

OLIVER GAGE RODS



Center splice, insulated to withstand 2,000 volts with fibre plates and bushings.



Forged steel rail hook.

Oliver Insulated Gage Rods can be used where signal circuits are carried by the rails. Hard fibre plates and bushings are assembled in the center section as shown in the photograph above to prevent electrical leakage through the rod. They are tested at 2,000 volts A.C. The fibre parts withstand a lateral stress of 45,000 to 50,000 pounds. All fibre parts and metallic parts in contact with the fibre insulation are coated with insulating varnish.

Several types of rail jaws and hooks are available, the most popular being shown above.

We will gladly give you full details on Oliver Gage Rods and other railroad items.

OLIVER IRON AND STEEL Corporation

South Tenth and Muriel Sts. · Pittsburgh 3, Pa.

Railway Personnel (Cont'd)

Bridge and Building

Reginald Tourner, bridge and building master of the Canadian Pacific at Edmonton, Alta., has retired after 38 years of service.

Charles Landry, bridge and building master of the Canadian Pacific at Smiths Falls, Ont., retired recently.

W. W. Caines, assistant supervisor of bridges and buildings on the Chesapeake & Ohio, has been promoted to supervisor of bridges and buildings, with headquarters as before at Huntington, W.Va., succeeding **F. A. Scites,** who has retired.

Robert C. Cox has been appointed supervisor bridges and buildings of the Western Pacific, with headquarters at Sacramento, Cal., succeeding **Norman A. McPherson,** who has been promoted to general supervisor structures and work equipment at that point.

Water Service

T. J. Arline, Jr., has been appointed acting supervisor water supply for the Northern division of the Atlantic Coast Line, at Savannah, Ga.

Special

A. R. Miller, assistant engineer, industrial department, of the Missouri Pacific, has been appointed industrial agent, at St. Louis, Mo.

Obituary

Edgar J. Haley, retired general roadmaster of the Southern division of the Atlantic Coast Line, died on January 29, 1949.

Turner Hughes, retired assistant roadmaster of the Shenandoah division of the Norfolk & Western, died on February 16.

Robert W. Clifton, retired roadmaster of the Pocahontas division of the Norfolk & Western, died on February 9.

Daniel B. Packard, chief engineer of the Winston-Salem Southbound, died in Rocky Mount, N.C., on February 25, following a prolong illness.

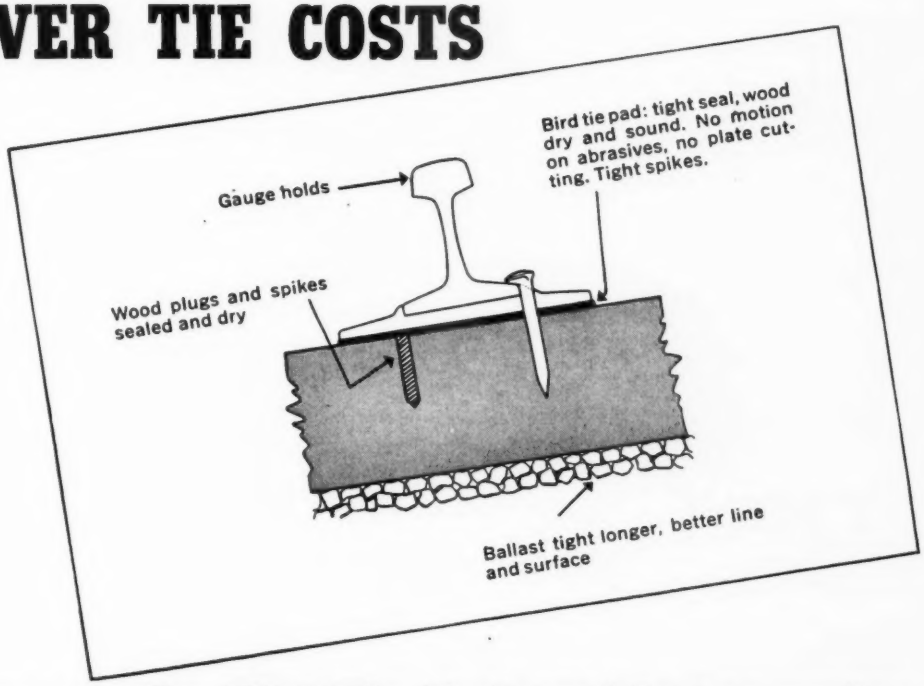
J. F. Gaul, retired assistant roadmaster of the Canadian National, died recently at Douglastown, Que. He was 72 years of age.

James F. Pringle, vice-president of the Central region of the Canadian National, with headquarters at Toronto, Ont., and an engineer by training and experience, died in that city on February 8, following a brief illness.

John E. Rogan, who retired as assistant engineer maintenance of way, Illinois Central, in March, 1948, because of ill health, died in a hospital in New Orleans, La., on March 24.

(*Please turn to page* 510)

LOWER TIE COSTS


Bird tie pad: tight seal, wood dry and sound. No motion on abrasives, no plate cutting. Tight spikes.
Gauge holds
Wood plugs and spikes sealed and dry
Ballast tight longer, better line and surface

Because the Bird Tie Pad seal keeps under plate wood dry, sound and clean!

The Bird Tie Pad seal eliminates the three major factors that combine to cause under plate tie failure . . .

Bird Tie Pads form a water resistant seal . . . under plate and spike hole wood is kept dry and sound.

Bird Tie Pads form a tight seal . . . plate motion against the wood is eliminated.

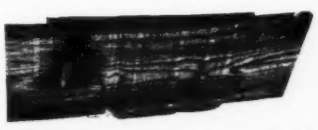
Bird Tie Pads form a dustproof seal . . . the entry of sand and other abrasives is prevented—the elimination of both motion against the wood and abrasives removes the two factors causing plate penetration.

Savings on cross tie bills from tie life extension alone will usually run in the order of 20 per cent . . . more on expensive bridge and switch ties and fast wearing points such as sharp curvature. Even greater savings are possible! Bird Tie Pads reduce labor required to maintain gauge, line and surface, and make smaller tie plates thoroughly practical . . . superior in performance to larger plates without pads.

The above statements are based on ten years of in-track experience and research. We believe they are justified by the facts which we have developed. Let us tell you more about this important development—write Bird & Son, inc., 12 Birch Street, East Walpole, Massachusetts.

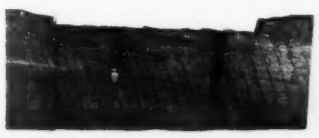
BIRD TIE PADS

East Walpole, BIRD & SON inc. Established 1795 *Massachusetts*



Vertical cross section from typical Bird Tie Pad installation . . clean, dry, sealed wood and spike hole.

Tie without pad in early stage . . . surface wood is checking and breaking up. Notice stained wet area around spike hole.



Tie without pad in advanced stage . . . moisture softened, broken down spike hole and surface wood, and deep plate penteration.

.It's *yardage* that counts! And my MICHIGAN has convinced me that you don't always need a big dipper to get big yardage. No matter what I put her on—sand, gravel, clay, rock—that baby *really* goes to town! Gets out more yardage per hour than any shovel that size I've ever owned. She crowds and swings fast, and dumps fast and clean. When anyone says truck shovels to *me*, I say, 'my *next* one's a MICHIGAN, too!' For the best 'buy' in a truck shovel, get a MICHIGAN!"

Write for Bulletin 100—
"On the Job With MICHIGAN"

DID YOU KNOW
you can buy
a brand new
MICHIGAN
TRUCK CRANE
complete with
chassis for as
little as $10,250
F.O.B. factory?

MICHIGAN

MICHIGAN POWER SHOVEL COMPANY
400 SECOND STREET, BENTON HARBOR, MICHIGAN, U.S.A.

Association News

Wood Preservers' Association

Early closing of this issue of *Maintenance* makes it impossible to report here on the annual meeting of the association scheduled to be held in St. Louis, Mo., April 26-28. A highlight report of this meeting will appear in the June issue, with appropriate coverage of any reports or addresses that are of special interest to maintenance officers.

Metropolitan Maintenance of Way Club

The last meeting of the club was held on April 28 in the Skyline room of the Hotel Sheraton, New York. The meeting was designated as "Honorary Members Night" and a number of the honorary members attended as guests of the club. The program featured a round-table discussion on "What About the 40-Hour Week?" This discussion was led by P. O. Ferris, chief engineer, Delaware & Hudson, Albany, N.Y., as moderator, and brought out many ideas of the various roads in the New York territory with regard to the changes being planned to offset the loss of productive man-hours that will develop when the 40-hr. week goes into effect in the railway field next fall.

(*Please turn to page* 512)

Meetings and Conventions

American Railway Bridge and Building Association—Annual meeting, September 12-14, 1949, Hotel Stevens, Chicago. Elise LaChance, Secretary, 431 S. Dearborn street, Chicago 5.

American Railway Engineering Association—Annual Meeting, March 14-16, 1950, Chicago. W. S. Lacher, secretary, 59 E. Van Buren street, Chicago 5.

American Wood-Preservers' Association—H. L. Dawson, secretary-treasurer, 1429 Eye street, N.W., Washington 5, D.C.

Bridge and Building Supply Men's Association—E. C. Gunther, secretary, 122 S. Michigan avenue, Chicago 3.

Maintenance of Way Club of Chicago—Next meeting, October 24, 1949. E. C. Patterson, secretary-treasurer, Room 1512, 400 W. Madison street, Chicago 6.

Metropolitan Maintenance of Way Club—John S. Vreeland, secretary, 30 Church street, New York.

National Railway Appliance Association—R. B. Fisher, secretary, 1 No. LaSalle street, Chicago 4.

Railway Tie Association—Annual convention, September 12-14, 1949, Peabody Hotel, Memphis, Tenn. Roy M. Edmonds, secretary-treasurer, 610 Shell Building, St. Louis 3, Mo.

Roadmasters' and Maintenance of Way Association of America—Annual meeting, September 12-14, 1949, Hotel Stevens, Chicago. Elise LaChance, secretary, 431 S. Dearborn street, Chicago 5.

Track Supply Association—Lewis Thomas, secretary, 59 E. Van Buren street, Chicago 5.

COMPRESSION

Rail Anchors

The efficient, economical operation of many modern interlocking plants is safeguarded with Compression two-way holding. In these important remote-controlled installations, closely-held rail is vital.

THE RAILS COMPANY

General Office

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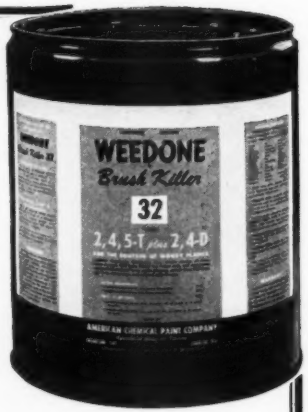
KILL

WOODY PLANTS AND WEEDS

on right-of-ways with



WEEDONE BRUSH KILLER 32

contains the powerful 2,4,5-T and 2,4-D in ester form

Highly Concentrated • Lowest in Actual Cost

1 GALLON MAKES 100 GALLONS SPRAY SOLUTION

WEEDONE BRUSH KILLER 32 offers you these advantages:

- Kills weeds and woody plants to the root tips.
- NOT poisonous to livestock or humans.
- Kills a greater range of woody plants than either 2,4,5-T or 2,4-D sprays used alone.
- Economical to use. Annual cost of controlling woody plants is substantially reduced.
- Nothing to be added. Ready for mixing with *water* or oil and spraying immediately.
- Does not constitute a fire hazard.
- Can be used in any sprayer.

The formulation of 2,4,5-T and 2,4-D in **WEEDONE BRUSH KILLER 32** has been proven on thousands of acres of brush.

Write us for technical information on your particular weed control problems.

Also available: WEEDONE 2,4,5-T an ester containing 3 lbs. 2,4,5-T acid per gallon.

AMERICAN CHEMICAL PAINT COMPANY

Agricultural Chemicals Division

AMBLER, PA.

ORIGINATORS OF 2,4-D AND 2,4,5-T WEEDKILLERS

Association News (Cont'd)

Track Supply Association; B. & B. Supply Men's Association

Even though these groups will not have an exhibit this year during the concurrent conventions of the Roadmasters' Association and the American Railway Bridge and Building Association in September, they will sponsor the usual banquet for the members of the two associations. The banquet will be held on Tuesday evening, September 13, the second day of the concurrent conventions and will feature a program of entertainment.

B. & B. Association

The next important meeting in the interest of the association will be that of the Executive committee, which is scheduled to convene in Chicago, July 18, to review all technical committee reports, now under preparation, for presentation at the annual convention in Chicago, September 12-14. Progress is reported in the preparation of all these reports, as well as in plans for the convention which, as in recent years, will be held concurrent with, but independent of, the annual meeting of the Roadmasters' Association. Special features of this program already contemplate at least two joint sessions with the Roadmasters and the annual banquet on September 13, to be tendered to the two associations jointly by the Track Supply Association and the Bridge and Building Supply Men's Association.

Roadmasters' Association

With all technical committees at work, the officers of the association await the next scheduled meeting of the Executive committee, July 11, in Chicago, to preview all of the technical reports to be presented before the convention in Chicago, September 12-14. In the meantime, the drive for new members continues, with invitations going out to several hundred railway engineering and maintenance officers of supervisory rank, and plans are progressing for the annual meeting.

The annual convention this year will again be held concurrent with, but independent of, the annual meeting of the American Railway and Bridge and Building Association. However, its program will incorporate two joint sessions with the B. & B. group and the annual banquet on September 13, tendered to the two associations by the Track Association and the Bridge and Building Supply Men's Association.

American Railway Engineering Association

The outstanding meeting of the association during the last month was that called by President Schwinn of all committee chairmen in Chicago on April 12. Some of the features of this meeting, which was attended by 11 officers and directors of the association and 23 com-

(*Continued on page* 514)

This alert Midwestern Railroad "flattens" maintenance and construction costs with versatile Lorain Cranepower

REGARDLESS of the job requirements—trackside excavating, drainage ditching, or right-of-way clearance—this Lorain-41, working as a clamshell, serves as "man of all work" for a progressive midwestern railroad. For the Lorain-41 is a versatile machine which is easily converted for many excavating and material handling jobs by means of various boom attachments. In addition, it may be transported or worked from a flat for on-the-track service, then easily unloaded under its own power for off-the-track work.

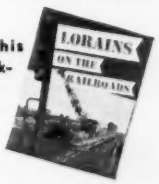
Mechanizing material handling and construction jobs is an effective way of combating rising costs in railroad operations. The Lorain line of shovels and cranes offers a size and type to fit every phase of your construction and maintenance program, with a choice of crawler and rubber-tire mountings, permitting you to select the degree of mobility suited to your operations.

If you would put your maintenance, construction and material handling jobs on a "flat cost" basis, contact your local Thew-Lorain distributor today. He'll help you get more mileage out of your maintenance dollars.

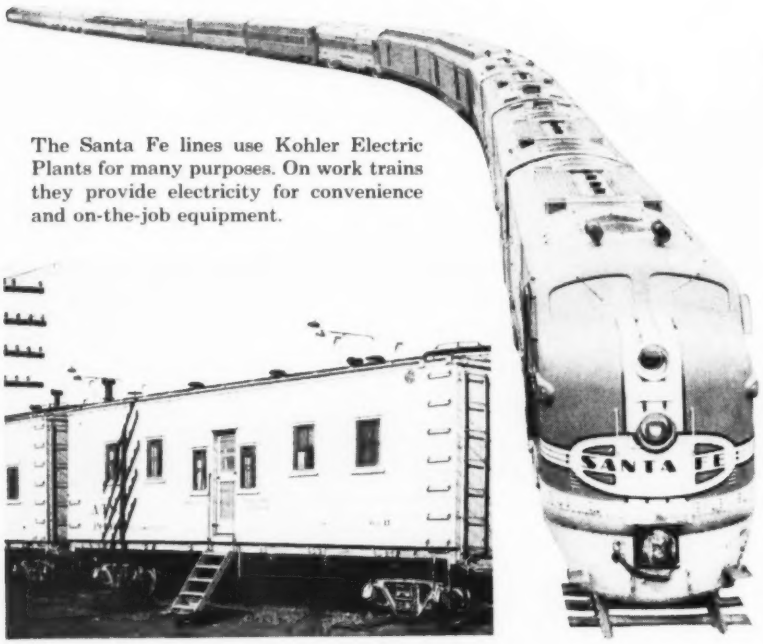
THE THEW SHOVEL COMPANY • Lorain, Ohio

thew-Lorain®

You'll want this new FREE booklet. Write for it today!



CRANES • SHOVELS • DRAGLINES • MOTO-CRANES



The Santa Fe lines use Kohler Electric Plants for many purposes. On work trains they provide electricity for convenience and on-the-job equipment.

Electricity for all railroad needs

KOHLER

Electric Plants

Independent and stand-by service

LIGHT AND POWER FOR:

Construction • Maintenance Jobs • Electro Magnets • Tunnels • Pullman Cars • Refrigerator Cars • Work Trains

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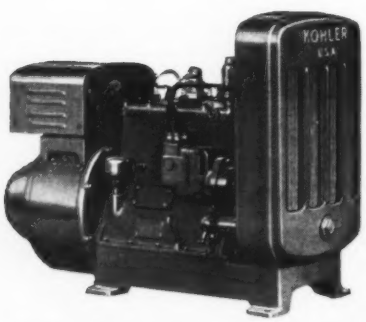
Signal Systems • Radio Telephone • Other Emergency Needs

Kohler Electric Plants are used by most American railroads. Their reputation is based on reliable, heavy-duty service through long hours of operation on many different jobs.

For signals and other operations essential to safety and efficiency, stand-by Kohler Electric Plants are installed to provide immediate emergency current when storms or accidents cut off central service station electricity.

Sizes from 750 watts to 10 KW. Write for illustrated folder E-2. Kohler Co., Kohler, Wisconsin. Established in 1873.



Kohler Electric Plant 3A21, 3KW, 115volt AC. Automatic start and stop. Length 41", width 16", height 27¼".

KOHLER OF KOHLER

PLUMBING FIXTURES • HEATING EQUIPMENT • ELECTRIC PLANTS

Association News (Cont'd)

mittee chairmen or vice-chairmen, included a discussion of committee organization and of getting the year's work started; personnel of committee, assignment of subjects, and the preparation and filing of reports. President Schwinn also sought the suggestions and advice of committee chairmen relative to means of increasing the effectiveness of the Manual and decreasing the expense of its printing and distribution, and in addition, the feeling of those present as to a return to the practice at annual meetings of meeting as a one group, rather than of having concurrent sessions such as were a feature of the Fiftieth Anniversary meeting this year.

A total of seven technical committees have scheduled meetings for May. These are as follows: Maintenance of Way Work Equipment, May 3, Chicago; Iron and Steel Structures, May 9 and 10, Washington, D.C.; Rail, May 12, Engineers' Club, Chicago; Uniform General Contract Forms, May 23, association headquarters, Chicago; Masonry, May 23 and 24, Richmond, Va.; Wood Bridges and Trestles, May 24, association headquarters, Chicago; Buildings, May 26 and 27 (tentative), New York.

Maintenance of Way Club of Chicago

The Annual meeting of the club was held on the evening of April 25, beginning with a dinner at 6:30 p.m., and, with 256 members and guests present, broke all attendance records for the year.

The program featured the subject "The 40-hour Week—What Now in Maintenance of Way Work?" and was in the form of a "Town Meeting" discussion, with the following men on the panel: D. P. Loomis, chairman, Association of Western Railways; C. M. Chumley, engr. m. of w., I.C. system; T. A. Blair, ch. engr., system, A.T.&S.F.; C. G. Grove, ch. engr. m. of w., Western region, P.R.R.; and E. C. Vandenburgh, ch. engr., C.&N.W., with President W. G. Powrie, engr. m. of w., C.M.St.P.&P., acting as moderator.

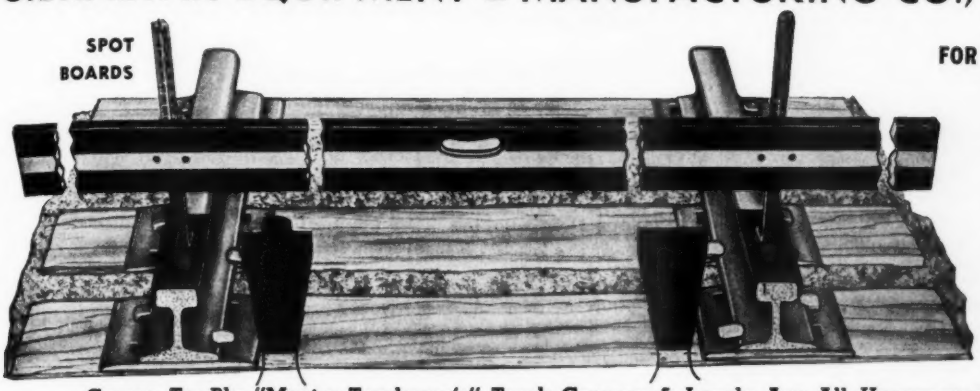
In the election of officers for the ensuing year, S. H. Shepley, asst. ch. engr., E.J.&E., and first vice-president of the club, was advanced to president; V. V. Holmberg, engr. m. of w., C.&W.I.—Belt Railway of Chicago, and second vice-president of the club, was advanced to first vice-president; T. A. Blair, ch. engr., system, A.T.&S.F., and a director of the club, was elected second vice-president; Neal D. Howard, editor, *Railway Engineering and Maintenance*, was re-elected executive secretary; and E. C. Patterson, asst. ch. clk., C.&N.W., was re-elected secretary-treasurer. In addition, the three following were elected directors: L. R. Lamport, engr. of m., C.&N.W.; F. E. Austerman, asst. ch. engr., Chicago Union Station Company; and Frank J. Reagan, sales mgr., American Fork & Hoe Co. The next meeting of the club will be held on October 24.

(*Please turn to page* 516)

"GEMCO TRU-BLU TOOLS". BEST TRACK TOOLS FOR TOP TONNAGE TRANSPORTATION! MADE BY:

GIBRALTAR EQUIPMENT & MANUFACTURING CO., ALTON, ILL.

SPOT BOARDS



HEADQUARTERS
FOR GEMCO TRU-BLU

"MASTER TRACKMEN'S" TRACK TOOLS MADE TO YOUR OWN PLANS. ALSO ALL STANDARD ITEMS — CAR MOVERS, GAUGES, BENDERS, RAIL CARS, LEVELS, TIE TONGS, RAIL DRILLS, CAR-STOPS, DERAILS, LEVELERS, GREASE GUNS, ETC.

Gemco Tru-Blu "Master Trackmen's" Track Gauges & Levels Are All Unsurpassed in Quality!

← AF89-No. 23 — Extra strong pipe center with cast steel ends.

← AF70 - No. 10 — Made of thoroughly seasoned Western Pine.

AF68-No. 5 — Made of thoroughly seasoned Western Pine.

← AF164-No. 3 — Level 2 Adj. Levels.

→ AF64-No. 1 — Made of Western Pine with hardwood bar.

← AF69 - No. 6 — Steel binding provide 3½ inch elevation.

→ AF97-No. 27—Latest approved A.R.E.A. Plan.

A.R.E.A. PLAN No. 20.

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GEMCO "MASTER TRACKMEN'S" ITEMS—GEMS OF ENGINEERING DESIGN FOR TOPS IN EFFICIENCY!

★ Weighs only 45 lbs. complete with 20" blade and chain

★ 5 models (20 to 60 in. blades) for trees to 5 feet in diameter

★ Full 5 hp... Chain is easily sharpened by hand filing

FASTEST WAY
to clear out trees

Save days of labor in clearing trees—limbing, felling, and bucking—by using McCulloch full-swivel chain saws.

The McCulloch, with the Rip-Cross chain will rapidly fell, rip, and buck any kind of wood. It's a *heavy-duty* saw that's really *light.* The McCulloch can go anywhere—in steep and rough country where heavy machinery would bog down.

MODERN TOOL FOR RAILROADS For tree maintenance, for road-building and bridge construction, and for clearing power-lines and right-of-ways, speed and efficiency result from the use of McCulloch saws. Send for detailed information.

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SEND for detailed information

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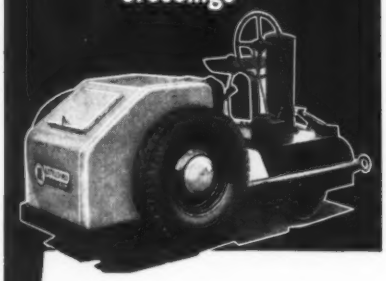
SPEEDS UP LIMBING

BUCKS ANY LOG QUICKLY

RAILWAY MAINTENANCE CREWMEN USE
the LITTLEFORD TRAIL-O-ROLLER
for Permanent Crossings



This small, compact, portable Trail-O-Roller makes blacktop crossings, parking areas, station platforms smooth permanent surfaces. The Trail-O-Roller can roll dozens of jobs in a single day—it travels as fast as the maintenance truck can go, yet it takes only 2 minutes to change it from the trailing to rolling position. And too, the compaction is as great as any 5 ton tandem roller.

If you're looking for a time and labor saving unit this Trail-O-Roller will give you the low cost way for doing permanent blacktop maintenance work. Many railroads are using the Trail-O-Roller today to save labor costs—you too can save with a Trail-O-Roller. Write for Bulletin No. 3.

Trail-O-Roller trails behind any maintenance truck.

LB LITTLEFORD
BLACK TOP ROAD MAINTENANCE EQUIPMENT SINCE 1920
LITTLEFORD BROS., INC.
471 E. Pearl St., Cincinnati 2, Ohio

Supply Trade News

Personal

John B. Pegram has been appointed assistant sales manager for **McCulloch Motors Corporation,** Los Angeles, Cal.

G. S. Ellis has been appointed service engineer for the **Black & Decker Manufacturing Company** at Seattle, Wash., succeeding **R. A. Lomas,** who has been transferred in the same capacity to Los Angeles, Cal.

Carl J. Chappell, field engineer of the **Portland Cement Association** in charge of activities in Missouri, has been promoted to district engineer, with headquarters at St. Louis, Mo., succeeding **Harry E. Frech,** who has retired after 30 years with the association.

Leo H. Corning, assistant manager of the structural and railways bureau of the **Portland Cement Association,** has been promoted to manager of the bureau at Chicago, succeeding the late **Arthur J. Boase,** whose death was reported in the March issue. Mr. Corning was graduated from the Case Institute of Technology with a Bachelor of Science degree in civil engineering. During World War I he served as an engineering instructor in the Coast Artillery Corps of the United States Army, following which he engaged in private practice as an architect and engineer in Florida, and later served as structural engineer with the M. A. Hanna Company at Cleveland, Ohio, and as design engineer for the water department of that city. Prior to joining the Portland Cement Association in May, 1929, he held the position of structural engineer with the Foundation Company, contractors and engineers, at Chicago. Mr. Corning was appointed assistant manager of the association's structural and railways bureau in 1935, which post he held at the time of his recent promotion to the position of manager of the bureau

Leo H. Corning

James F. McCartney has been appointed eastern district sales manager of the **Duff-Norton Manufacturing Company,** with headquarters at New York to succeed **G. L. Mayer,** who retired but will continue with the company in an advisory capacity. Mr. McCartney was formerly associated with the Pressed Steel Car Company and, for the past seven years, was eastern representative with offices in New York.

James F. McCartney

James W. Ritcey, mechanical superintendent, Pennsylvania district, **Oxweld Railroad Service Company** (unit of **Union Carbide & Carbon Corp.**), has been promoted to sales representative of the firm's New York sales office. Mr. Ritcey has been succeeded by **H. V. Dorminey.**

The **Hyster Company,** Portland, Ore., has appointed **William Kilkenny** as district manager of industrial truck sales in the western division. Mr. Kilkenny will have jurisdiction over 11 western states and four western provinces of Canada, as well as Alaska and Hawaii. The company also has announced the transfer of **Jack A. Cairns,** formerly assistant to the western division sales manager at Portland, to a sales engineering position in the Los Angeles, Cal., area.

James M. Darbaker, manager of operations for the Chicago district of the **Carnegie-Illinois Steel Corporation** (subsidiary of the **United States Steel Corporation**), has been appointed general manager of sales, and has been succeeded by **Stephen M. Jenks,** general superintendent of the Gary (Ind.) works. **John H. Vohr,** assistant general superintendent of the South Chicago plant, has been promoted to replace Mr. Jenks, and has been succeeded by **Edwin H. Gott,** assistant general superintendent of the Gary plant.

Obituary

H. W. Protzeller, consulting engineer, Railway Ballast Engineers, Inc., Milwaukee, Wis., and formerly associated with Fairmont Railway Motors, Inc. and Nordberg Manufacturing Company, died on April 6.

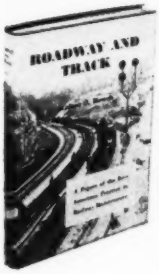
(*Please turn to page* 518)

With Supplement Bringing Information Up to July, 1948

ROADWAY AND TRACK

By WALTER F. RENCH

Formerly Supervisor on the Pennsylvania



Use of the latest mechanical equipment in roadway and track maintenance is clearly described and pictured. Older methods employed where full mechanical equipment is not available are also explained. Most of the methods described are those in use on the *Pennsylvania* but A.R.E.A. recommended practices and those in use on other well maintained roads are included. The economics resulting from the adoption of modern methods are clearly outlined.

While written primarily for track supervisors and other maintenance officers, the new edition contains material of interest to transportation and mechanical officers who require a working knowledge of fundamentals of track work. Section and extra gang foremen who wish to acquire a working knowledge of their work will find it in this book.

Contents

ROADWAY: Essential Elements in Roadway Maintenance—The Right of Way—Drainage of Roadbed and Track—Vegetation for Banks—Economics of Roadway Machines—Labor Saving Methods and Devices in Roadway Work—Small Tools and Their Uses. TRACK: Essential Elements in Maintenance of Track—Program for Maintenance of Way and Structures Work—The Track Obstruction—Power Machines and Equipment—Labor Saving Methods in Track Work—Track Materials and Their Uses—Practice in Rail Renewals—Practice in Rail Repair and Inspection—Maintenance of Main Tracks—Maintenance of Yards and Terminals.

SPECIAL PROBLEMS AND DUTIES: Maintenance Problems and Methods Used—Economics of Track Labor—Special Duties in the Maintenance of Way Department. 350 pages, 101 photographs, 19 line drawings, 12 tables, Index. 6 x 9, cloth.

$5.00

Ten Days Free Examination

Simmons-Boardman Publishing Corporation
30 Church Street, New York 7, N. Y.

Please send me on Ten Days Free Examination a copy of the Third Edition of ROADWAY AND TRACK by Walter F. Rench. If satisfactory, I will remit the list price of $5.00. Otherwise, I will mail the book back postpaid, without obligation.

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Company ..... Position .....

R.E.&M. 5-49

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WISCONSIN

Air-Cooled Heavy-Duty

ENGINES

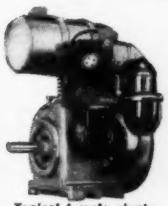
Stole Another Show

Last summer at the Road Show, and again in March at the National Railway Appliance Exhibit in Chicago... Wisconsin Air-Cooled Engines stole the show! At both of these exhibitions of the *best* in modern mechanized equipment, Wisconsin-powered machines were conspicuous by their broad representation.

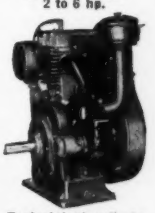
If you were at the NRAA Show, you may recall that you saw Wisconsin-powered equipment wherever you turned...including the five George Haiss Company conveyors outside the Coliseum at the Pettibone Mulliken Corporation's display pictured above . . . as well as equipment displayed in the Coliseum by such concerns as Chain Belt Co., Electric Tamper & Equipment Co., Binks Mfg. Co., Chicago Pneumatic Tool Co., Fairmont Railway Motors, Inc., The Koehring Co., White Mfg. Co., Northwestern Motor Co., Harnischfeger Corp., Wayer Impactor Sales Co., and Pettibone Mulliken Corporation.

This outstanding reliance on Wisconsin Air-Cooled Engine Power for a great variety of equipment from pumps and compressors to grouters and motor cars is warranted by the records of heavy-duty serviceability these engines deliver. Timken tapered roller bearings at BOTH ends of the drop-forged crankshaft on ALL models is a typical detail of Wisconsin Engine construction that assures Most H. P. Hours of the on-the-job service.

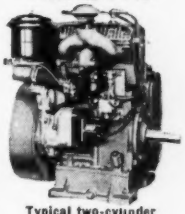
Available in 4-cycle single cylinder, 2-cylinder and V-type 4-cylinder models, 2 to 30 hp. Specify "Wisconsin."



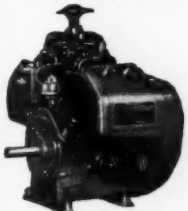
Typical 4-cycle, single cylinder model, 2 to 6 hp.



Typical single cylinder model, 4½ to 9 hp.



Typical two-cylinder model, 7 to 13 hp.



Typical V-type, four-cylinder model, 15 to 30 hp.

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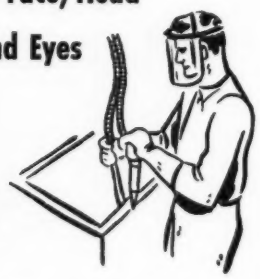

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Trade Publications

(To obtain copies of any of the publications mentioned in this column, use postcards, page 459)

Ric-Wil Prefabricated Insulated Piping Systems—The Ric-Wil Company, Cleveland, Ohio, has published a 12-page booklet containing photographs and descriptions of Ric-Wil insulated piping systems on a number of different railroads.

American Model 830 Diesel Locomotive Crane—The American Hoist & Derrick Co. has issued a 20-page catalog containing specifications, design details and action photographs of its 30-ton Diesel locomotive crane.

Racine Railway Maintenance Machines—The Racine Tool & Machine Co. has issued a 12-page bulletin, attractively printed in three colors, describing and illustrating four Racine railway maintenance machines — the portable tie tamper, rail drill, bonding drill and rail saw.

Erie Railroad and Industrial Fueling Equipment—Erie Meter Systems, Inc., has published a 16-page illustrated bulletin describing the Erie line of equipment for the dispensing of liquid fuels, including pumping equipment, meters, filters, strainers, special valves, dehydrators, water separators, air eliminators, and kindred items necessary for fueling plants.

Butler Built Steel Buildings—The Butler Manufacturing Company, Kansas City, Mo., has published an eight-page illustrated booklet describing four types of Butler steel buildings designed especially for railway uses at low cost. These types are the rigid-frame truss-clear steel-aluminum buildings, the bowstring-truss construction for steel-aluminum buildings, packaged steel buildings—small utility type, and boulevard buildings—Key-lock steel panel construction.

Grouting:—A Discussion—This is the title of a four-page, illustrated pamphlet recently published by Robert Mayo, civil engineer, which discusses, briefly, several applications of the grouting process and describes the Mayo Pneumatic Grouter. Among the applications mentioned are the grouting of dam foundations, shafts and tunnels before lining. Others include grouting back of lagging, liner plates and concrete lining in tunnels, and roadbed stabilization.

Pole Buyers' Guide—Koppers Company, Inc., has issued an 18-page technical bulletin intended as an informative guide for buyers and users of poles. The bulletin presents service records, electrical-resistance information, and comparative cost figures of pressure-creosoted poles; specifications for all species of poles; manufacturing requirements for bark removal, sawing, trimming, framing and marking; and five tables of dimensions for different species of poles, along with a diagram showing measurement of sweep and short crooks in poles.

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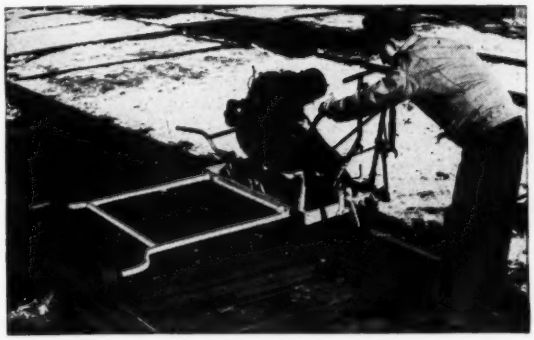

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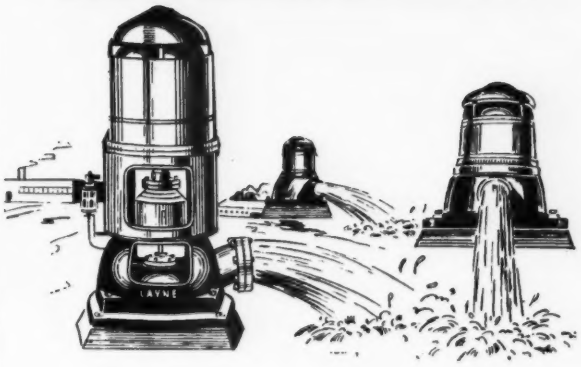

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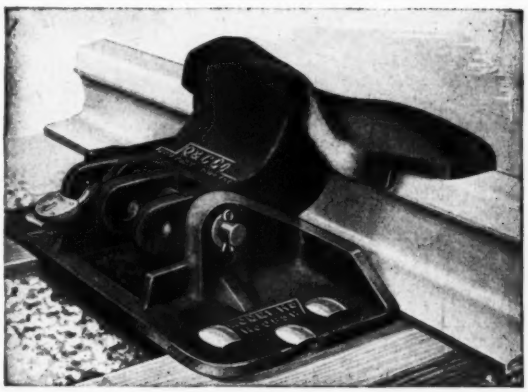

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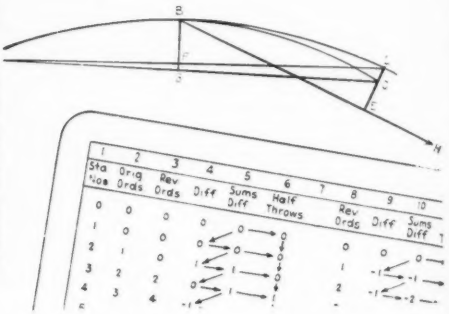

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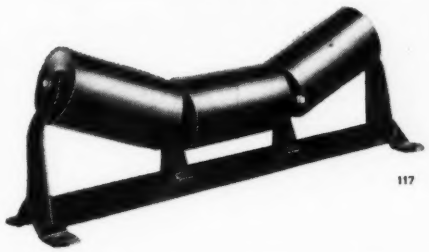

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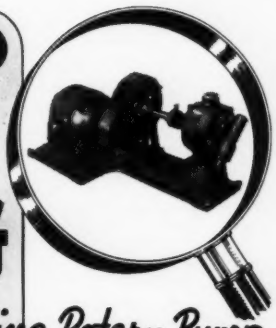

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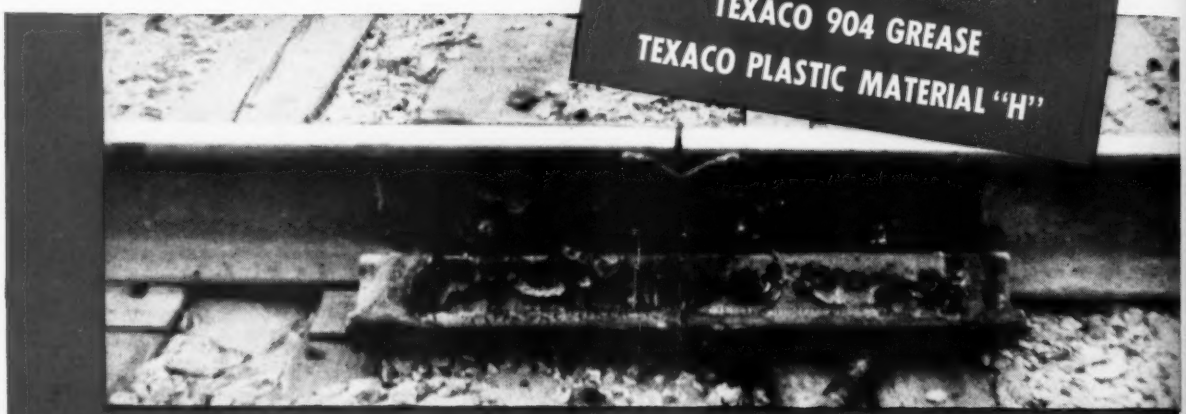

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